CERTIGRADE HANDBOOK OF RED CEDAR SHINGLES

PRICE 50 CENTS

CERTIGRADE HANDBOOK OF RED CEDAR SHINGLES

(Tenth Edition, Revised)

by

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PROFESSOR, FOREST PRODUCTS

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RED CEDAR SHINGLE BUREAU

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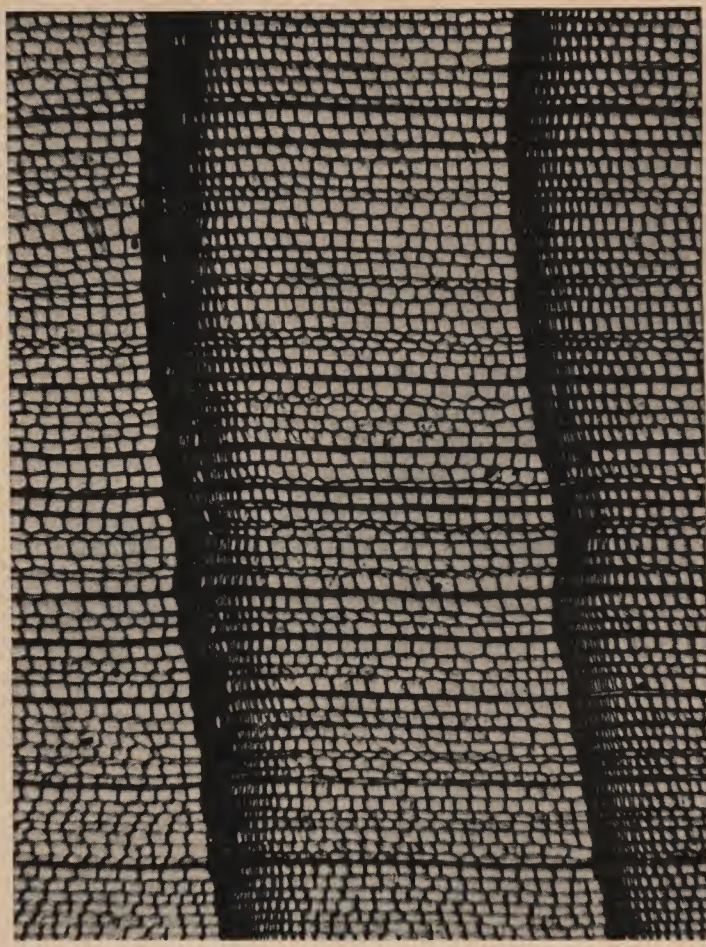


● A cross section of a CERTIGRADE Shingle showing a few of the air-filled heat insulating cells—there are several million in every cubic inch of Western Red Cedar wood. Dark horizontal lines are wood rays that reinforce against splitting. Vertical dark lines mark the limits of one annual ring, magnified 40 times.

THE TERM "shingle" is applied to a piece of ultra-durable wood having parallel sides and being thicker at one end than at the other, used in covering the sides and roofs of houses, being light in weight but capable of resisting the highest winds and heaviest hail-stones, and affording maximum protection from the weather, and at the same time presenting a beautiful appearance.

This is a rather simple description of a CERTIGRADE shingle of red cedar, but is a dictionary-like description that can not be applied to shingles at random, for CERTIGRADES are manufactured according to exacting standards from the finest and most durable shingle-wood—western red cedar, *Thuja plicata*—and are graded with scrupulous care. While the term "shingle" has often been debased and loosely applied to products made from non-wood "composition" materials, the term "CERTIGRADE" can only be applied to red cedar shingles that meet the very severe and rigid requirements of the RED CEDAR SHINGLE BUREAU.

Definitely the finest shingles that have been offered the public as a standardized and inspected product, these inspected shingles are identified, in each of the several grades, by a label on every bundle bearing the word CERTIGRADE. No manufacturer who is unwilling to meet the requirements of the RED CEDAR SHINGLE BUREAU can obtain or use these labels, which certify that the shingles so identified have been inspected and guaranteed as to grade by this Bureau.

Contents

Western Red Cedar, and the Qualities Demanded in a Superior Shingle Wood

THE manufacture of shingles of CERTIGRADE quality can be accomplished only through the use of superior wood of unusual mechanical and physical properties. Furthermore, this wood must be available in trees of sufficiently large dimensions to permit the manufacture of No. 1 CERTIGRADE *edge-grain* shingles and must be relatively free from knots so that shingles free from blemishes and with undistorted grain can be produced in large quantities.

Cedar Meets All Requirements

The tree species that meets these requirements completely is WESTERN RED CEDAR, or *Thuja plicata* D. Don, as it is known to scientists. While the botanical range of this tree extends from southern Alaska to southern Oregon and eastward to Montana, it reaches its optimum development in the coastal region, where it attains great dimensions. Due to the immensity of the trees which grow here, it was formerly designated by botanists as *Thuja gigantea* Nuttall. Landscape gardeners, who make much use of this species as an ornamental tree, call it the GIANT ARBORVITAE, or tree-of-life, for trees sixteen feet in diameter and 700 to 800 years old are even today encountered in the forests. Larger and older trees are on record. In describing the wood of this wonderful tree, the late George B. Sudworth, Dendrologist for the United States Forest Service, in his book entitled the "Forest Trees of the Pacific Slope," states that "great durability under all sorts of exposure is its most important commercial quality."

Has Unusually High Crushing Strength

In proportion to its weight, the wood of western red cedar is exceptionally strong. Ordinary microscopic studies do not disclose the reason for this strength, but recent investigations have indicated that it is probably due to the high percentage of infiltrated matter fixed in the wood, which greatly increases the crushing strength.

Low Shrinkage Rate Is Important

In addition to durability and strength combined with light weight, a good shingle wood must have a low coefficient of expansion

and contraction with changes in moisture content. As expansion and contraction of vertical grain (or "edge-grain") cedar is less than half as much as that of flat-grain (which is however much lower than that of most softwoods), vertical grain shingles give the best service. A comparison between western red cedar and another wood will be of interest. A vertical grain board of good hard pine will shrink almost twice as much as one of western red cedar in drying from a wet to an air-dry condition, and being denser and less elastic will be far more apt to check and split in the process.

Cedar Is Invariably Fine-Grained Wood

While trees of western red cedar so often reach great dimensions, they grow slowly, and therefore the wood that is produced has narrow annual rings. The result is fine, evenly-grained wood, with uniform texture, which is ideal for the manufacture of the highest grades of shingles. Moreover, the large logs supply an ample amount of straight-grained material, which is essential in the sawing of shingles of CERTIGRADE quality. The quantity of western red cedar available in the tremendous forests of the Pacific Northwest is so great that an adequate supply for the next hundred years is assured.

Why CERTIGRADE Shingles Lie Flat

A good shingle wood must saw smoothly, and show a minimum tendency to warp and twist, so that the shingles will lie flat and tight on the roof. Western red cedar possesses these qualities to a remarkable degree. Stresses caused by differential moisture absorption quickly become equalized, and therefore, when wood of the proper quality is used and the shingles are properly manufactured, they will lie flat on side walls or roof. Western red cedar, with its freedom from checking and warping, combined with light weight and extreme durability, is the ideal shingle wood—and the rigid inspection of the RED CEDAR SHINGLE BUREAU insures proper manufacture. The result is the CERTIGRADE shingle.

How CERTIGRADE Shingles Are Manufactured

CERTIGRADE shingles must be made from the best of material—small, knotty logs cannot be used. In logging, as it is conducted in the Coast region, three and sometimes even four or more different species of trees are logged simultaneously. These include western red cedar, Douglas fir, west coast hemlock, Sitka spruce and white fir, grand fir or noble fir.

Power Logging Is Required

Most of the timber being logged today by heavy, high-powered machinery in this region is in old-growth, virgin stands, and consequently stumpage prices are quite high. (The term "stumpage" refers to standing timber, or "timber on the stump," and uncut.) Wherever possible, as it is most practical to "clear cut" this timber (in areas of such limited size, however, that they will be promptly re-seeded from the adjoining uncut timber), the small and young western red cedar that is suitable for telephone and transmission line poles and the Douglas fir that is suitable for piling are first cut and removed, so that they will not be damaged when the immense trees which constitute the major portion of the stand are felled.

● Western Red Cedar trees reach great dimensions and yield fine, clear wood.

How Shingle Bolts Are Produced

Sometimes the large cedar trees are felled before other logging begins, particularly in smaller operations, and instead of sawing or "bucking" the trees into log lengths, short sections a trifle longer than 48 inches (or 54 inches, as the case may be) are cut. These sections are split with heavy mauls and wedges into "bolts," much resembling overgrown cordwood in appearance, for more convenient transportation to the shingle mill in the absence of logging machinery. At the saw-mill, these bolts are cut into blocks 16, 18 or 24 inches in length by means of "equalizer" saws, spaced the proper distance apart.

Most CERTIGRADES Are Cut From Logs

By far the greater proportion of the cedar used for the manufacture of shingles comes to the mill in the form of logs. Sorting and handling of these logs, which are usually cut to long lengths in the woods, is possible only when they are floating in water, and therefore all log mills are provided with log ponds. Power machinery in the ponds is commonly used in cutting the logs to shorter lengths so that the mill can be supplied with logs that will produce the grades of shingles that are being manufactured in the proper proportion.

World's Largest Saws Must Be Used

The logs are hauled up into the mill in a massive chute equipped with a huge endless, power-driven, conveyor chain, known as a "log haul." At the mill-end of the log haul, heavy steel stops arrest the forward motion of the log as giant steel clamps, actuated by a large steam cylinder and piston, hold it firmly in place, the log haul drive being thrown out of gear. A large circular saw (as large as ten feet in diameter) with high-speed inserted teeth or bits which cut through the log rapidly and which plane the sides of the cut smoothly as they go through, cuts the log into 16, 18 or 24 inch lengths with precision, the length of the section cut being determined by the spacing of the steel stop that is used. Some logs are so large that even a huge saw of this diameter is too small. To reduce such logs to short lengths, a very large auxiliary steam driven drag saw is usually provided.

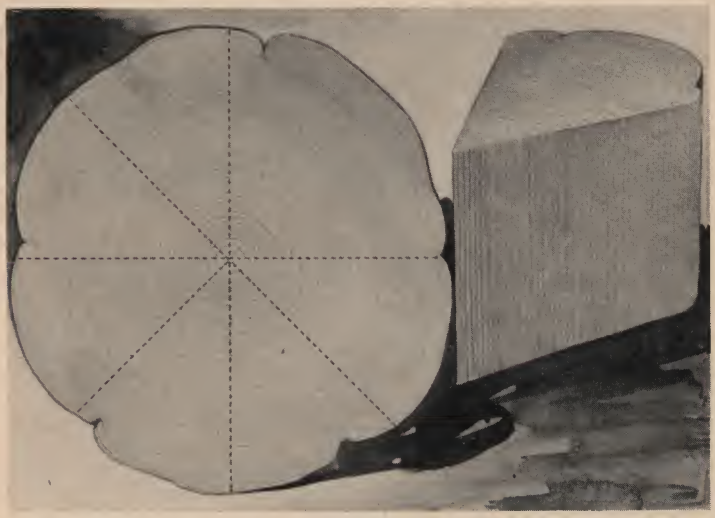
Blocks Are Quartered and Requartered

The large log sections of the proper length must next be split or cut to the proper sizes of blocks for the shingle machines. In do-

ing this, they are quartered, split and requartered, until they are of a convenient size, every effort being made to make blocks that have a true edge-grain face.

Upright Machines Produce CERTIGRADES

In sawing shingles, it is now virtually universal practice to use so-called "upright machines," so that one sawyer can joint or edge and grade the shingles that are cut from one single block. This permits the sawyer to readjust the block from time to time so that the highest possible grade of shingles will always be pro-



● Sections cut from the large logs are quartered and requartered to produce choice vertical-grain blocks.

duced. This type of shingle machine is equipped with a reciprocating, power-driven carriage, which carries the block past a thin-gauge, razor-sharp circular saw, which cuts off a shingle smoothly at each stroke. On each return stroke of the carriage pawls engage with the feed rolls between which the block is firmly held, the upper feed roll and the lower feed roll being alternately turned so that a tapered shingle with the butt either up or down is cut at each stroke.

The Sawyer First Determines Grade

The sawyer picks up each shingle as it comes from the saw, places it on a "springboard" with the butt held firmly against a

guide which is exactly at right angles to the blade of a second circular saw, and presses the springboard down so that the overhanging edge of the shingle is clipped off smoothly. Flipping the shingle over in his hand, he repeats the process, making another smooth edge parallel to the one first cut. If defects were present in the shingle as it came from the saw, he joints the shingle in such a way that a narrower shingle, or two shingles, without defects, can be obtained. The sawyer then drops the shingle into the proper chute, depending upon the grade, which leads to the packing bins below.

Double Grading Follows

The packer grades the shingles again as he packs them into bundles in a packing frame, thus checking the work of the sawyer. This double grading is again checked from time to time by the foreman or the superintendent, for at any time the official inspector of the Red Cedar Shingle Bureau is apt to walk into the mill.

Bureau Inspection Is Supremely Important

Frequent calls are made at irregular intervals by this inspector. He checks the triple inspection by selecting bundles of shingles at random, breaking them open and surveying their contents. Adherence to the letter and intent of the grading rules is required, and mills are "scored" or given a rating depending upon the care with which the individual bundles are packed, so that the management will know what measures to take to avoid loss of the right to use the labels or how "sound" their own inspection is. As a result, the average CERTIGRADE bundle does not merely meet the *minimum* requirements of the rules, but represents a good average *above* this minimum.

The inspectors employed by the Red Cedar Shingle Bureau are men who have had many years of experience in the manufacture of shingles. They are paid by the Bureau, and are responsible only to the Bureau. Technical knowledge and practical experience are requisites for this important work, and the inspectors are always chosen with great care.

Seasoning of CERTIGRADE Shingles

AS SHINGLES are packed or bundled immediately after sawing, they are, at this stage, in a "green" or unseasoned condition. The moisture content of the wood is well above the fiber-saturation point, and consequently no shrinkage has taken place. At this point, a decision must be made as to the subsequent procedure that will be advisable. The shingles may be sold and shipped as *green, air-dry or kiln-dry.*

Green and Air-Dried Shingles

Shingles are packed immediately after they are sawed and many shingles are shipped without further processing. The initial moisture content of western red cedar wood is variable. The heartwood of cedar trees growing at high elevations often contains as little as 40% of moisture based on the dry weight of the wood, while low-land cedar may be much higher in moisture content.

Air-seasoning is accomplished by stacking the shingles in the yard or under a shed roof. After a period of time, depending upon prevailing climatic conditions, shingles will reach a satisfactory moisture content for application on sidewalls or roofs, to give characteristically normal, trouble-free service.

Kiln-Drying Demands "Air-Conditioning"

In commercial practice, for rail shipments the process known as "kiln-drying" has been generally adopted. In this process, the shingles are placed in a room in which weather conditions are under absolute control, the temperature being maintained at the desired point by automatic controllers, in the same manner as the temperature is regulated in air-conditioned houses. Moreover, the relative humidity, which at any given temperature is the most important factor in controlling the rate and extent of drying, is also regulated and maintained at the most desirable level.

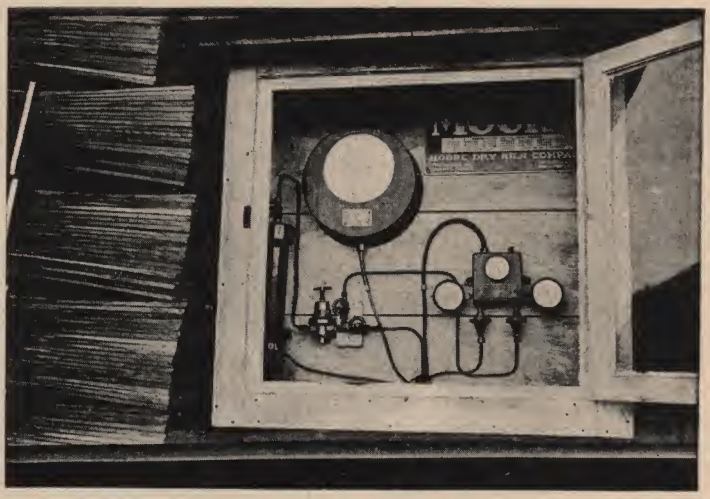
CERTIGRADES Are Kiln-Dried with Care

As the temperatures that are used in the kiln-drying of CERTIGRADE shingles are far below the boiling point of water, the wood is left in perfect condition by this method of accelerated seasoning. Before CERTIGRADE shingles were manufactured, attempts were often made to remove *all* of the moisture, to save

freight charges. This could be done only by using very high temperatures, thus "baking" the shingles dry, making the wood brittle and causing actual damage to the wood structure. Mills which make use of such practices are denied the right of using CERTIGRADE labels, as such shingles will not give satisfactory service.

Kiln-Drying Sterilizes the Wood

Proper kiln-drying, as assured by the CERTIGRADE labels, offers undeniable advantages in rail shipments. In the first place,



● Automatic controllers regulate the air condition in kilns which season CERTIGRADE shingles.

all of the shingles are reduced to a uniform moisture content and are bright and clean when shipped. The drying process also *sterilizes* the wood completely. Properly kiln-dried shingles are *clean,* in every sense of the word.

Re-pressing Tightens Bundles After Drying

All dried or seasoned CERTIGRADE shingles are "re-pressed." As during the drying process the shingles shrink in a normal way, the bundles become rather loose. Therefore, to make the bundles withstand the shocks and jars of railroad shipment, they are placed, one by one, in a solidly constructed frame in which pressure is exerted uniformly upon the ends so that the shingles are

wedged tightly together under the band-sticks. This produces bundles with nice, uniform ends, avoids losses due to broken bundles, and causes the shingles to present a very attractive appearance in the retail yard.

Storage of Shingles

RED CEDAR SHINGLES constitute the only side wall and roofing material that can be stored out-of-doors! They are *made* to resist weather. Certain precautions in the storage of shingles will, however, prove advantageous, regardless of the fact that shingles "can take it."

Shed Storage Is Best

When CERTIGRADE shingles are applied on a side wall or roof, they should be at a reasonably uniform moisture content. Therefore, if they are piled out in the open, a platform should be provided, so that the first layer of bundles will not be in contact with the ground, to prevent the undue absorption of moisture. Boards should be used to cover the top of the pile to keep out rain and to prevent over-drying of the bundles in the top layers in the broiling heat of the sun, so that *all* of the bundles in the pile will reach the same moisture content. As clean, bright shingles are more attractive, storage in a shed is most desirable. Customers all over the country are demanding the CERTIGRADE labels on every bundle, and shed storage *protects the labels.*

Grades—and Their Uses

CONSTANT improvements from time to time in the manufacture of CERTIGRADE shingles are reflected in necessary minor changes in the grading rules. These can always be obtained upon application to the Red Cedar Shingle Bureau or to the local retail lumber dealer. They will therefore not be reprinted in full in this handbook.

Why There Are Three Grades of CERTIGRADE Shingles

"Why should there be more than *one* grade in each size of shingle?" is a question that is often asked. The answer, to one who has visited the coast region and has seen the manufacture of shingles in progress, is obvious. Even such a uniformly textured wood as western red cedar exhibits variations in its properties. Logs of different dimensions come to the mill. Some have been

● CERTIGRADE red cedar shingle roofs and CERTIGROOVE machine-grooved shake walls contribute to the quiet charm of this attractive residential street. Added roof texture has been achieved by applying the shingles in thatch or weave styles.

cut from trees that have grown very rapidly; others are from trees that have taken a long, long time to mature. Some trees from which the logs were cut had low crowns with many limbs; others had thin crowns with few limbs. So there *is* a difference in the raw material that is available.

Federal Government Helped Make Grading Rules

The grading rules now in force are those formulated by the Bureau of Standards of the U. S. Department of Commerce in cooperation with the Red Cedar Shingle Bureau and the majority of the shingle manufacturers. They are therefore the recognized, official, standards of the industry. A discussion of the grades that are recognized, and their major uses, follows.

Majority of Shingles Are In Random Widths

Most CERTIGRADE shingles are manufactured in *random widths,* but as tests have demonstrated that shingles wider than 14 inches will not give maximum service, this represents the upper limit of width in *all* grades.

Three Standard Lengths

Three different standard lengths are recognized. The shortest shingles are 16 inches long, the intermediate length is 18 inches and the longest length is 24 inches. Ten per cent of the shingles in any shipment may be one inch over or under the specified length, and shingles cut from "equalized" blocks or which have been "rebutted" may be ¼ inch less than the specified lengths, to allow for saw kerf. Every effort is made to cut the shingles to exact lengths, but the divergencies that are allowed are necessary to insure the sawing of shingles with straight grain. Bad cross grain shingles are *not* permitted in *any* grade.

CERTIGRADE Sixteen-Inch Shingles

SHINGLES 16 inches long, the smallest size, must be so thick that five shingles, when measured across the butts (or thickest portion) when green must measure two full inches. As these shingles are packed in bundles with twenty courses on each side of the band-sticks, the bundle must therefore measure 8 inches in thickness when green. If measured after seasoning has occurred, an allowance of ¼ inch is made for shrinkage. In the lowest grade, an additional allowance of ¼ inch is made for variation in sawing.

For Long-Lived Roof Construction

CERTIGRADE No. 1 Blue Label—16″—5/2″ (Number one, sixteen inch, five [shingles] to two [inches]) shingles, also called "Five X" (Written XXXXX), represent the best, or premium grade that is manufactured in this length and thickness. These extra fine shingles are intended primarily for roof construction, where the shingles should lie flat and tight and where there must be complete protection from rain-water driven by high winds.

These shingles are all "edge-grain" or vertical-grain. That is, the annual rings are exposed on the flat surface of the shingle as narrow, straight bands of dense summer-wood closely crowded together and running parallel to the edges of the shingle. They show, therefore, a minimum tendency to expand and contract with changes in moisture content, and as they are keyed together by the pith-rays which run at right angles through the wood, they are highly resistant to splitting. No knots of any kind are permitted, and they must consist entirely of heartwood. No shingles narrower than 3 inches are permitted, and not more than 10% of the combined width of the shingles laid side by side (or "running" inches) in any shipment may be less than 4 inches in width. (This proviso applies to No. 1 Blue Label shingles of all sizes except 24-inch.)

These shingles are of a superior grade for side walls on fine houses. On steep roofs (one-third pitch or steeper) they can be expected to have a life of more than thirty-five years under average climatic conditions; on one-fourth pitch roofs a life of at least 25 years can be anticipated. On side walls they will have an indefinite life usually greater than the useful life of the structure.

These Shingles Make Excellent Side Walls

CERTIGRADE Red Label—16″—5/2″ shingles will make good roofs for secondary buildings, as well as excellent side walls, and offer good service for over-roofing over old wood shingles. Shingles of this grade must be clear, or free from blemishes, for three-fourths of their length as measured from the butt. A maximum width of only one inch of sapwood is permissible in the first ten inches. Mixed vertical and flat-grain are allowed. The minimum width permissible is the same as in the No. 1 grade, but the average width of the shingles may be somewhat narrower. However, not more than 20% of the running inches in

any shipment may be less than 4 inches wide. (This proviso applies to Red Label shingles in all sizes.) Red Label shingles are ideal for the under courses in the double-coursing of side walls with No. 1 shingles, and the saving in cost is considerable. A complete discussion of methods of double-coursing is found in another portion of this handbook. Please consult the index.

An Economical Grade for Low Cost Work

CERTIGRADE No. 3 Black Label—16″—5/2″ shingles are suitable for uses where economy is the greatest factor, but when properly applied they will give good service. Farmers or others who wish to do their own shingling can use these shingles on secondary buildings, as well as in over-roofing over old wood shingles, to good advantage, for in such cases the additional time required for application is not an important factor. They can also be used as under courses in the renewal of side walls on either small or pretentious homes, adding valuable insulation to the walls. They are much in demand for side walls on private garages, summer homes and smaller buildings on the farmstead, and they will outlast other side wall materials that sell at a much greater price. These shingles must be clear for the bottom 6″ of their length. Good shingles in which the taper is a trifle too abrupt, resulting in "shims" or "feather tips," are permitted in this grade if they are at least 14 inches long. An average thickness of ¼ inch less than the standard bundle thickness of 8 inches is permitted, with the usual further shrinkage allowance of ¼ inch. None of the shingles can be narrower than 2½ inches, and not more than 30% of the running inches in any shipment may be less than 4 inches wide. (This last proviso applies to No. 3 shingles in all sizes.)

Red Label and No. 3 Black Label Grades Give Satisfaction

It will be noted that No. 1 Blue Label shingles are of exceptional quality, but attention is directed to the fact that Red Labels and No. 3 Black Labels are not necessarily "fall-downs" in the sawing of No. 1's. It is true, of course, that many shingles that do not quite measure up to the standards demanded in Grade No. 1 will fall into these secondary grades, but most of these latter shingles are manufactured from high-grade cedar blocks in which the angle of the grain is such that while excellent Red Labels can be cut, the waste produced in an attempt to manufacture strictly vertical-grain No. 1's would be inordinately high. These good shingles are not to be compared with the knotty

second grades produced from other species, as even in the No. 3 Black Labels at least the lower 6″ of each shingle must be clear.

Special Undercoursing Shingles

An Undercoursing shingle is produced expressly for use on double-coursed side walls for the inner and completely concealed course or layer. Available at very low cost, these shingles, when used in combination with a higher-grade shingle or shake for the outer course, provide a first-class side wall at a remarkably low figure. These shingles should not be used for any purpose other than undercoursing. Some mills mix their No. 3 and Undercoursing shingles, and these are known as Special Undercoursing shingles.

CERTIGRADE Eighteen-Inch Shingles

CERTIGRADE No. 1 Blue Label—18″—5/2¼″ shingles are eighteen inches long and are considerably thicker at the butts than 16-inch shingles. As they are intended for use on the finest types of structures, they are strictly edge-grain and all heart-wood. When properly applied to roofs or side walls, the cost per year falls to an almost unbelievably low figure, due to the long life of shingles of such high quality. There are eighteen courses of shingles in each half of the bundle, and the covering capacity for roofs is based upon a 5½″ exposure; therefore the rapidity with which these shingles can be laid is increased. Shingles of this grade are often referred to as "Perfections," and the use of the term is not unjustified.

For Side Walls and Roofs

CERTIGRADE Red Label—18″—5/2¼″ shingles constitute an alternative grade—not a "fall down" from No. 1 Blue Labels—in which flat-grain is permitted as well as vertical grain. A total of only one inch of sapwood is permitted in the first 10 inches, and the lower 12 inches must be entirely clear. Shingles with a trifle too much taper, so that they end in "feather tips," are permitted, if they are at least 16 inches long. Minimum widths are 3 inches, and the shrinkage allowance is the customary 3%.

While these shingles are not intended primarily for roofs, they give excellent service on secondary buildings, such as barns, implement sheds and other farm structures. They are excellent for use on side walls, and old and architecturally out-moded

houses can be converted into beautiful homes by applying these CERTIGRADE shingles on the side wall.

Black Label Shingles for Utility Purposes

CERTIGRADE No. 3 Black Label—18″—5/2¼″ shingles are ideal for selected uses. They represent an economy grade that can be used for side walls on summer homes, as undercoursing on double-coursed side walls, or they can be applied satisfactorily to roofs of secondary buildings. The lower six inches of these shingles must be clear. No "shims" or "feather-tipped" shingles are permitted unless the shingles are at least 14 inches long.

Shingles Made Expressly for Undercoursing

As is the case with the 16″ shingles, 18″—5/2¼″ shingles are available in an Undercoursing type produced for use as the concealed under course of double-coursed side walls. They make possible a remarkably low-cost side wall, at no sacrifice in appearance or quality.

CERTIGRADE Twenty-Four-Inch Shingles

CERTIGRADE No. 1 Blue Label—24″—4/2″ shingles, two feet long and with one-half-inch butts, are often appropriately called "Royals." How many have not envied the fortunate possessor of a magnificent estate with a beautiful home covered with the large, thick shingles that look like they will last forever, but which seem, "Ah, so expensive?"

Moderate in Cost But Look Expensive

A great many people who do not even dream of the possibility of homes with roofs and side walls of such character, can actually afford them, for they are not really as expensive as they seem. The much wider exposures that are permissible, and the low cost of applying these shingles, brings the cost down sharply. The added insulation value also lowers the cost of heating houses to a marked degree. On side walls an exposure of 11½ inches is possible, and with double-coursing, using Red Labels or No. 3 Black Labels for the undercoursing, shadow lines a full inch in depth are obtained, with exposures up to 16 inches. In combination with shingles of smaller dimensions, an architectural change in a building, producing new and more beauty of line, often becomes possible to the satisfaction of the owner.

● THE CERTIGRADE HOME, shown here shortly after its completion in beautiful Lacey Forests of Arlington County, Virginia, has the distinction of receiving the first F.H.A. commitment ever issued by that agency. Both roof and walls are of CERTIGRADE shingles.

Consult Grading Rules for Description

No. 1 Blue Labels are, of course, strictly edge-grain, all heartwood and clear. Red Labels permit mixed grain and must be 16 inches clear or better and No. 3 Black Labels must be 10 inches clear and better. Consult the Grading Rules for a complete description of each grade. All 24-inch shingles are packed with 13 courses in one end of the bundle and 14 courses in the other.

CERTIGRADE Dimension Shingles

CERTIGRADE "dimension" shingles, that is, shingles jointed to definite widths, are available in each of the sizes in which random width shingles are manufactured. Sixteen and eighteen-inch shingles are manufactured in 5 or 6-inch widths, and 24-inch shingles are manufactured in 6-inch widths. Red Label dimension shingles are available in the 16-inch lengths only, in both widths. All dimension shingles are sold on the basis of a net count, which is given in the Grading Rules, but one square, when laid with the recommended exposure for roofs or side walls will cover one hundred square feet. Dimension shingles are used for special architectural effects, or to build additions to structures built in part of other dimension shingles, to obtain uniformity in appearance and for side walls of "staggering" type.

How CERTIGRADE Shingles Are Packed—and Why

CERTIGRADE shingles are packed in conventional bundles because this form of package is conveniently handled both at the mill and on the job, and is, moreover, very economical. The two sticks between which the ends of the shingles are tightly gripped are known as "band sticks," and they are always made of good straight lumber. The metal straps connecting these band sticks are known as "bands." Packaged in this manner, the bundled shingles are easily dried or seasoned, remaining perfectly flat in the process. On the job, it is an easy matter to open a bundle with one single stroke of the shingling hatchet, and yet the bundles can not be readily broken in accidental fashion.

Only REAL Shingles Can Be Bundled

The stiffness and strength of cedar shingles permits this method of packaging—only good wood shingles can be handled in this manner. Materials offered as substitutes for shingles are often fragile and easily damaged in shipment or in handling, and therefore must be packaged in cartons or carefully attached to boards.

Look for the CERTIGRADE Labels

The CERTIGRADE labels are either inserted under the band stick when the shingles are bundled, or are pasted on the bundle. These labels are supplied to the shingle mills in small allotments which are delivered at specific intervals, depending upon the actual cut of the mill. If the Bureau inspectors find that the shingles manufactured fall below the requirements of the Grading Rules, the supply of labels is withheld until the trouble is corrected.

● Emergencies caused by wind and hail storms often justify the immediate application of genuine CERTIGRADE red cedar shingles right over the damaged "composition" to save the interior and contents of the house, and better results may be expected than with any other material of equivalent cost.

● Deep shadow lines, made possible by double-coursing the shingles on the side walls, characterize this beautiful midwestern home. CERTIGRADE quality assures permanency as well as beauty.

Roof Squares Include Four Bundles

CERTIGRADE shingles are packed in bundles, four of these bundles containing a sufficient number of shingles to cover an area of one hundred square feet when properly applied at the recommended exposure. A ROOF SQUARE *consists of* FOUR *bundles, but to cover a square (100 square feet) on a side wall, fewer shingles are required because of the greater permissible weather exposure when single-coursed or double-coursed.* Bear this fact in mind when estimating the amount of shingles required, for the cost of shingles for side walls is consequently much less than for the corresponding roof areas.

The following table summarizes the sizes, packing rules and number of running inches per square of CERTIGRADE shingles:

Summary of Sizes, Packing Rules and Running Inches per Square of CERTIGRADE Shingles

Grades	Shingle Thicknesses (Green)	Approximate Bundle Thickness, Inches		No. of Courses per Bundle	No. of Bundles Required per Square	No. Running Inches per Sq.
		Green	Dry		Roof	Roof
No. 1—Blue Label—24″ (Royals)	4 Butts =2″	6½/7	6⅓/6¾	13/14	4	1998
No. 1—Blue Label—18″ (Perfections)	5 Butts =2¼″	8⅛	7⅞	18/18	4	2664
No. 1—Blue Label—16″ (Perfects 5X)	5 Butts =2″	8	7¾	20/20	4	2960
Red Label—24″ (16″ Clear)	4 Butts =2″	6½/7	6⅓/6¾	13/14	4	1998
Red Label—18″ (12″ Clear)	5 Butts =2¼″	8⅛	7⅞	18/18	4	2664
Red Label—16″ (12″ Clear)	5 Butts =2″	8	7¾	20/20	4	2960
No. 3—Black Label—24″ (10″ Clear)	4 Butts =2″	6¼/6¾	6/6½	13/14	4	1998
No. 3—Black Label—18″ (6″ Clear)	5 Butts =2¼″	7⅞	7⅝	18/18	4	2664
No. 3—Black Label—16″ (6″ Clear)	5 Butts =2″	7¾	7½	20/20	4	2960

No. 1 and Red Label Grades Dimensions	Shingle Thicknesses (Green)	Widths (Green)	No. of Courses per Bundle	Additional Cross Shingles	No. of Bundles Required per Square	No. Pieces per Bundle
					Roof	
24″ x 6″	4 Butts=2″	6″	14/14		4	84
18″ x 5″	5 Butts =2¼″	5″	16/16	8	4	136
18″ x 6″	5 Butts=2¼″	6″	17/18	8	4	113
16″ x 5″	5 Butts =2″	5″	18/18	8	4	152
16″ x 6″	5 Butts - 2″	6″	19/20	8	4	125

Note No. 1—A small amount is allowed for shrinkage from green to dry wood. See Grading Rules for specific grade measurements, and also note third column, this table.

Note No. 2—No definite number of random width shingles are packed in a bundle; minimum content is determined by actual running (combined width of shingles laid side by side) inches of wood contained.

Recommended Practices in the Application of CERTIGRADE Shingles

WELL manufactured red cedar shingles have earned such an enviable record in their performance on roofs, that when the architect, contractor or builder contemplates the construction of any new building with a sloping roof, he instinctively turns to red cedar shingles, or to some supposed equivalent therefor, as a roof covering. The roof of a building has maximum exposure to the elements, and therefore it *must* be good; the whole building depends upon it.

Shingles Make Superior Side Walls

Side walls, on the other hand, are never subjected to the weather to the same extent, and therefore there is a tendency to regard shingles on a side wall as extravagant use of good material. This is a mistake, however, for CERTIGRADE shingles on side walls constitute real economy coupled with long life.

In setting forth the application recommendations which follow, it must be kept in mind that these are *general* specifications which, while calculated to apply to the country as a whole, are subject to some revision and modification in certain areas because of variable factors such as climate and weather conditions. The application of shingle roofs will be discussed first.

What Is Meant by "Pitch" of Roofs

Shingles are suitable for use on all roofs that have sufficient slope to insure good drainage. The slope or "rake" of roofs is termed the "pitch," and roof pitches are commonly expressed in terms of the ratio of the "rise" to the "run." For instance, if the span of a shed roof (the horizontal distance between the outside edges of the plates on top of the outside walls) is equal to the height of the ridge above the bottom edges of the floor or ceiling joists resting on the plates, the roof will be designated as "one-half pitch" (or "square pitch"); or, in other words, in a house with gable ends, the height of the ridge pole above the walls will be one-half the width of the house. Similarly, if the ratio of rise to run is six inches to one foot, the roof will be "one-quarter pitch," or the height of the ridge pole will be one-fourth the width of the house mentioned. Common roof pitches are one-quarter, one-third and one-half, but steeper pitches, such as, for instance, five-eighths or three-quarters are not uncommon.

Required Weather Exposure Depends Upon Pitch

CERTIGRADE shingles may be laid with the standard exposure (covering 100 square feet with four bundles) on roofs of not less than five-24ths pitch. The standard exposures for 16-inch, 18-inch and 24-inch shingles are 5 inches, 5½ inches and 7½ inches, respectively. On roofs with less pitch than five-24ths, the shingle exposures should be reduced to 3¾ inches, 4¼ inches and 5¾ inches, respectively. For instance, instead of laying 16-inch shingles so that the distance between the butt lines of the shingles is 5 inches, this distance should be lessened to 3¾ inches. With this reduction of exposure, four layers of shingles are assured throughout the roof area. As an example, if it is necessary to lay shingles on a porch roof of one-eighth pitch, it is good practice to choose 18-inch shingles for this purpose and to lay these 4 inches to the weather.

While shingles last for exceedingly long periods of time on steep roofs (many instances are on record where 16-inch shingles have given good service for 75 years), the exposure can not be increased beyond a point equivalent to the length of the shingle minus one inch, divided by three. In all roof construction, there should be *three* layers of wood at every point, to insure complete freedom from leakage in heavy wind-driven rainstorms.

How to Estimate Shingles Required

Precise actual measurement of roof areas is, of course, most desirable, but the following method of computation is usually quite accurate.

In estimating the number of squares of shingles necessary to cover a roof, determine the ground area of the building, including the overhang of the eaves or cornices. To this area, in square feet, add the following percentage for the different roof pitches:

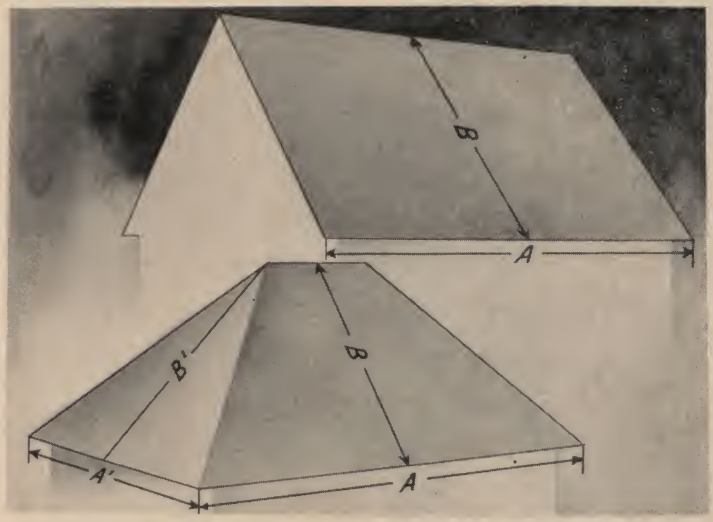
One-eighth pitch (rises 3″ in 12″)	3% of area
One-sixth pitch (rises 4″ in 12″)	5½% of area
Five-24ths pitch (rises 5″ in 12″)	8½% of area
One-quarter pitch (rises 6″ in 12″)	12% of area
One-third pitch (rises 8″ in 12″)	20% of area
One-half pitch (rises 12″ in 12″)	42% of area
Five-eighths pitch (rises 15″ in 12″)	60% of area
Three-quarters pitch (rises 18″ in 12″)	80% of area

Point off two places from the total, which is in square feet, to reduce this amount to "squares," or in other words, divide by 100 square feet.

If the standard exposure for the shingles as packed is to be used, this will give the total number of squares that will be required for the roof, exclusive of hips and valleys. For every hundred lineal feet of hips and valleys, an additional square of four bundles should be added to the total.

When Other Than Standard Exposure Is Used

In computing the number of squares that will be required if shingles are laid with less than the recommended maximum ex-



● Upper—A times B equals the area of one side of the roof. Multiply by 2 to find whole roof area in square feet. Measure all distances in feet. Lower—When B and B^1 are equal, the area of any hip roof equals A times B times 2.

posure, the following table may be used by dividing the total number of square feet of the roof as determined above (without first reducing to "squares") by the number given under each length of exposure:

	No. of Inches Exposed to the Weather							
	4	4½	5	5½	6	6½	7	7½
Sixteen-inch shingles	80	90	100	.....	.....	.....	.....	.....
Eighteen-inch shingles	70	80	90	100	.....	.....	.....	.....
Twenty-four-inch shingles	....	.....	.....	.....	80	90	95	100

As a further aid in computation, it will be noted from the above that while four bundles of 16-inch shingles will cover one

● The dignity and quiet charm traditionally associated with the all-shingle home are apparent in this modern residence. The horizontal lines of the home are accented by the heavy shadow-lines of the double-coursed shingle walls, plus the doubling of every sixth course of roof shingles to provide a "serrated" effect.

square (100 square feet) when applied with a 5-inch exposure, 5 bundles will be required when the exposure is 4 inches. It is quite obvious that the lesser the exposure, the greater will be the quantity of shingles required to cover a given area. (See coverage table on page 95.)

Roof Sheathing

THE choice of open or solid sheathing for the roof deck is optional when CERTIGRADE shingles are applied to roofs. If a solid roof deck is preferred, either matched or unmatched one-inch boards, shiplap, 5/16″ Douglas fir plywood (on rafters spaced 16 inches center-to-center), or ⅜″ plywood on 24-inch spaced rafters, may be used. When "composition" roofing in either roll or "shingle" form, of the pliable, saturated type is applied on a roof, a solid roof deck of *matched* lumber is demanded, for material of this kind acts as a condenser when weather conditions change rapidly, with a resultant accumulation of condensed water that may drip through the roof deck and ruin the ceilings. Many carpenters and contractors have wasted much time looking for mysterious leaks in such roofs, when in reality the trouble was due to the inability of the roof deck below to act as a tight roof and carry the condensed water down to the eaves *under* the condensing layer.

Shingles Eliminate Condensation Trouble

CERTIGRADE shingles are complete insurance against troubles due to condensation as they have high insulation value and because, in the vernacular of the layman, the roof "breathes." That is, the natural hygroscopic properties of the wood of the shingles come into play, and therefore all trouble of this nature is avoided. The only reason for using a solid roof deck with CERTIGRADE shingles is to gain the added insulation that such a deck offers, and in very cold climates this might seem justifiable despite the great amount of insulation afforded by the 3-ply shingle roof covering. (See page 82.) It is not needed for supporting the shingles, as these can be applied fully as well on "open" sheathing.

Use the Right Kind of Building Paper

Saturated building paper should not be applied to the roof deck before the shingles are laid. If added insulation is wanted, or it seems desirable to insure against air infiltration, the roof may be covered with rosin-sized building paper, "dry" or unsaturated

"deadening" felt or light-weight "blue" wallboard. Some architects prefer to specify the use of asbestos paper, which offers no disadvantages, and may, under certain circumstances, prove desirable. The use of insulating boards over the roof deck is not recommended, for these do not provide the necessary strength to support the nails even if longer nails which penetrate the sheathing are used.

Open Sheathing

When open sheathing is used (forming a so-called "slat deck"), 1x2, 1x3 or 1x4 boards normally are used. These boards are spaced apart on centers equal to the exposure to be given the shingles, with each course of shingles being nailed to a separate board. An alternative and economical method of construction is to use wider boards, such as 1x6, spaced apart on centers equal to *double* the shingle exposure, and nail two courses of shingles to each board. Rosin-sized paper or deadening felt may be applied over the slat deck, if desired.

Valleys and Flashings

TOO GREAT emphasis can not be placed upon the vital necessity of using good materials for valleys and flashings. Most of the leaks which occur in otherwise good roofs originate at these points.

Materials for Valleys and Flashings

The materials available for this purpose include *tin plate, terne plate, lead-clad iron, galvanized iron, soft lead sheets, hard lead sheets* and *sheet aluminum.* All exhibit varying degrees of durability under different conditions of exposure.

Tin Plate Must Be of Proper Grade

Unprotected "iron" sheets, even though the steel used in forming these may be "copper bearing," exhibit a rate of corrosion that is too rapid to warrant their consideration, and rust-resistant steel, or "stainless steel" is too expensive for ordinary use. Monel metal is likewise too costly for extensive use. "Tin" usually consists of sheets of mild steel that have been immersed in a bath of molten tin, after which the excess tin, while still in a molten condition, is squeezed off by running the sheets between steel rollers which act as "wringers." The thickness of the coating of tin thus applied can be varied through a wide

range, and the cheaper grades are given such a thin coating that the sheets are apt to begin to rust during the first season of exposure. The use of IC tin plate is not recommended; heavier plate, IX, will be necessary to avoid early corrosion. All tin plate should be soldered with half and half solder, using *rosin* as a flux, and should be well painted on both sides before it is placed in position. Tin, as a metal, is very resistant to corrosion, but is soft, and therefore the thin coating on tinned steel sheets is easily scratched through to the steel. If the tin coating is thus broken, the rate of corrosion of the steel becomes extremely rapid, as the tin is "cathodic" to the exposed steel, and the electrolytic effect becomes pronounced. As sharp bends can be made in tin plate without cracking the tin coating, it is a very useful flashing material.

Terne Plate Is Sometimes Used

Terne plate, or sheet steel coated with an alloy of 75% lead and 25% tin, of the same weight as the tin plate, IX, is sometimes used, and if properly protected with paint may give good service. All tin or terne plated sheets rust rapidly from the cut edges, where the steel is exposed, unless protected with paint.

Lead-Clad Iron Now Available

Lead-clad iron, or steel sheets coated with a comparatively heavy coating of lead are now on the market, and if used in weights no thinner than 28 gauge, will give good service.

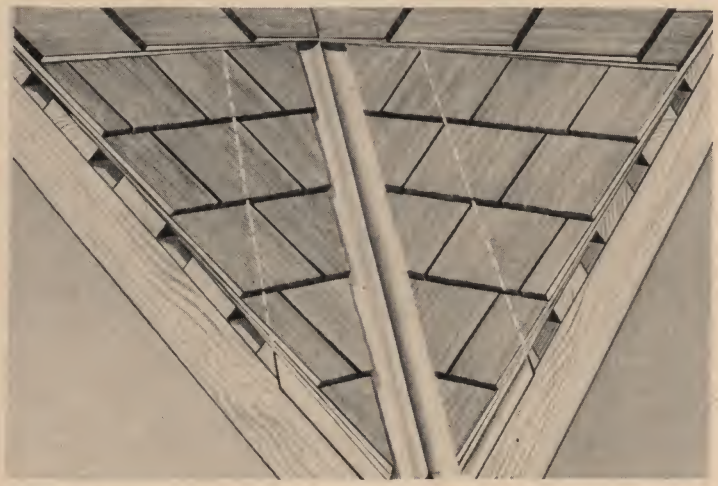
Why Zinc Prevents Rusting

Galvanized iron possesses certain superiorities over other coated sheets. It consists of mild steel sheets that have been coated with a layer of zinc by either an electroplating process or by dipping the sheets in a bath of molten zinc. This hot-dipped metal should be used in forming valleys, and it should have at least a 1½ ounce coating (per square foot). Reasonably heavy metal should be used, preferably 24 or 26 gauge, but it is common practice to use 28 gauge sheets and to paint all exposed metal. In making sharp bends in galvanized iron, there is a tendency to crack the zinc coating, and therefore care should be exercised. Smaller cracks and scratches are not apt to cause corrosion, however, nor do the cut ends, with the steel exposed, rust rapidly. This is due to the fact that zinc is *anodic,* and not cathodic to iron, wasting away very slowly, but in the process

preventing the rusting of the iron or steel. Some of the coated sheet metals consist of base sheets of charcoal or other rust-resisting iron. These are much longer lived than mild steel sheets.

Sheet Aluminum Is Available

Recently, the use of sheet aluminum for valleys and flashings has been increasing. If properly protected with bituminous paint, sheet aluminum (consisting of pure aluminum alloyed with small amounts of other metals) may give satisfactory service. Specific data on the life of aluminum sheets used for valleys and flashings are not as yet available. Bulletin No. UM-6, October 9, 1950, of the Underwriting Division, U. S. Federal Housing Administration, demands that "Aluminum sheets used for flashing shall have an alloy of 2S, 3S or 52S, minimum thickness 0.024 inches except as provided in 2-d. In addition, if continuous support is not provided beneath flashing (as in application over spaced roof sheathing) aluminum sheets shall have a minimum temper of H14 or H34. Sheets shall be cleaned and painted on both sides with a coating meeting the requirements of Federal Specifications SS-C-153 . . . or SS-R-451 . . . or other coating acceptable to the Chief Underwriter . . . " 2-d: "Flashings at heads and sills of openings in exterior walls shall have an alloy (see above), (and) minimum thickness 0.018 inches."



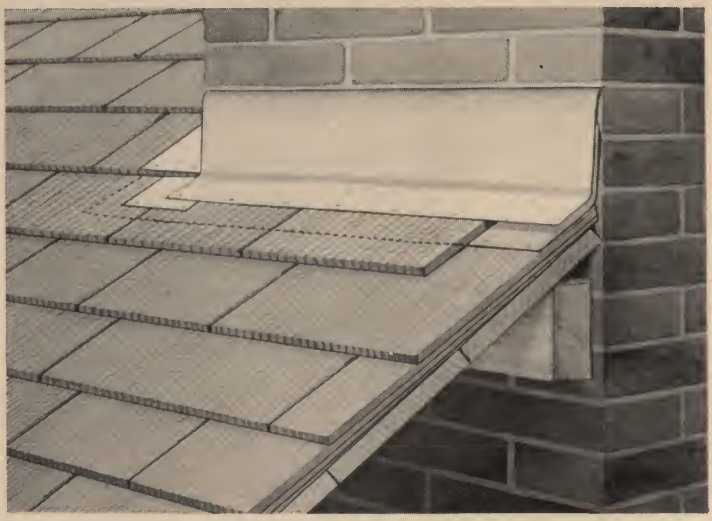
● Valleys should extend far enough under the shingles to insure complete drainage, with water-stop as shown if necessary.

● In applying CERTIGRADE shingles over composition shingles, 5d rust-resistant box nails should be used. (See page 56.)

Manufacturers insist that valley sheets 0.019 inches in thickness, 2S (or commercially pure aluminum) will give good service, without paint. If alkaline dust, or decaying organic litter, is not permitted to accumulate in valleys or lie in contact with flashings, or if ocean salt-spray is not a factor, it is probable that good results can be expected from sheet aluminum. It must be remembered, however, that long-time service tests on sheet aluminum are not yet available, and local conditions may militate against the use of this material. However, it appears to show promise for valleys and flashings.

How Valley Sheets Should Be Placed

On roofs of one-half pitch, or steeper, the valley sheets should extend up on each side of the center line of the valley for a distance of *at least* 7 inches. On roofs of lesser pitch, wider valley sheets should be used, extending at least 10 inches on either side. Careful judgment should be used in the placing of valleys in situations where snow is apt to drift in large quantities, so that if ice dams are likely to form, water will not dam up to such a high point that it will flow over the edges of the sheets. If the slope of a roof on one side of a valley is, for example, one-half pitch, and is one-fourth pitch on the other side, the valley sheet should extend upwards on the steep side for a dis-



● Flashings at chimneys must be carefully placed to prevent leakage.

tance of at least 7 inches and at least 10 inches on the one-fourth pitch side (or rather 8 inches, as a sheet 18 inches wide will probably cost no more than one 17 inches wide).

To avoid choking or restricting the delivery of a valley, and to prevent the splashing over of water flowing from a steep slope upon the shingles of one of lower slope or pitch, the edges of the shingles on the lower slope side should be lined up at least an inch farther back from the center line of the valley than those on the steep slope side or, as an alternative, a vertical ridge, or water stop, can be made by crimping the metal up in the center of the valley. The open portion of a valley should be at least 4 inches wide, in normal cases, but valleys may taper from a width of 2 inches where they start to a wider width as they descend at the rate of ½ inch per 8 feet of length. Butting of the shingles together in the valleys at the center line to form so-called "closed valleys" is not recommended.

Hip and ridge flashings are not, as a rule, required, as the chance for leakage to occur with proper ridges is very slight. However, if they are used, they need extend only for a distance of 3 inches on each side of the ridge. Chimney flashings should

be run up under the shingles for at least 6 inches (eight inches is better, particularly on the upper side) and should be backed up with non-drying bituminous mastic where they come into contact with the brick and covered with counter flashing. The use of metal "crickets" for flashing above chimneys is often regarded as best practice where heavy snowfalls are common. Great care should be exercised to so place the flashings that no leaks are apt to occur at such points. Apron flashings and flashings at the point where the roof meets a brick side wall, should be furnished the mason and built in by him. Such flashings are often a source of trouble, but when a roof meets a frame wall covered with siding or shingles, it is an easy matter to apply flashings in shingle lengths so that there can be no possibility of leakage. Shingle nails should be kept at the extreme edge or entirely off valleys and flashings.

Lead-Chromium Paint Best for Flashings

In painting flashings and valleys (especially tin) any good paint that does not accelerate the corrosion of steel or iron can be used. Some paints should be avoided, for they will increase the rate of corrosion. The best are white lead and

● Flashings and counter flashings are required against brick walls, but for wood walls, flashings in shingle lengths are completely satisfactory.

linseed oil, with the following pigments which may be used in greater or lesser amounts for color: chrome green (not emerald green—Paris green), chrome yellow, zinc chrome, yellow ochre, red lead (not Venetian red), chrome red (not Indian red or "barn paint"), Prince's metallic brown and burnt umber. The use of chromium resinate or chromium linoleate as driers to the extent of 5% to 10% of the weight of the linseed oil is recommended, as either of these has a strong tendency to prevent corrosion.

Ordinary oil paint directly applied to galvanized iron does not adhere well, due to grease or oil on the galvanized surface and to the smoothness of the metal. Washing the surface with mineral spirits and applying two priming coats of zinc dust-zinc oxide priming paint will result in good adhesion, and a third coat, tinted, will prevent corrosion. (See Federal Specification TT-P-641.) Galvanized iron that has been given a special treatment, including a priming coat that insures a proper bond when paint is applied, has recently become available everywhere. Paint of standard quality will give good service when applied to such pre-treated material. Bituminous paints adhere well and have good lasting qualities, but are invariably black in color. However, a "combination" bituminous paint includes aluminum powder as a pigment and as this paint dries the aluminum powder rises to the surface and leafs together, forming a light-colored film at the surface which has a high degree of durability. It is an excellent paint for valleys and flashings.

Tin or galvanized iron flashings and valleys give superior service when the metal is painted on both sides before it is placed in position, followed by a final coat of paint applied to the exposed metal after the roof has been laid. Careful attention to this detail will amply repay the homeowner, as it will be insurance against leaks at these vital points during the long period of service that can be expected after CERTIGRADE shingles have been chosen.

Flashings of the other metals previously mentioned are usually left unpainted.

Insulation Under Valleys

In cold climates, it is good practice to install valley sheets over building paper, cut in strips of the same width. This will prevent condensation that under some extreme circumstances may be troublesome.

Nails—A Factor of Great Importance

DO NOT use bright, or blued, steel wire nails in applying CERTIGRADE shingles. When a nail of this kind is driven through a red cedar shingle, a minute electric battery is formed, with the steel of the nail as an anode and the preservative material in the wood as a cathode. The iron in the steel of the nail promptly begins to dissolve, forming ferrous hydroxide. This is deposited in the wood around the nail hole, changing there first into ferric hydroxide and finally into ferric oxide, or "rust," leaving a nail hole but *no nail,* in the course of time. This means that an ordinary wire "shingle" nail is only a temporary attachment for a shingle. Therefore, *never* use bright or blued wire nails. They will rust away to a point where the shingles will sometimes begin to come loose in less than 10 years, even though the shingles themselves may be good for 60 years.

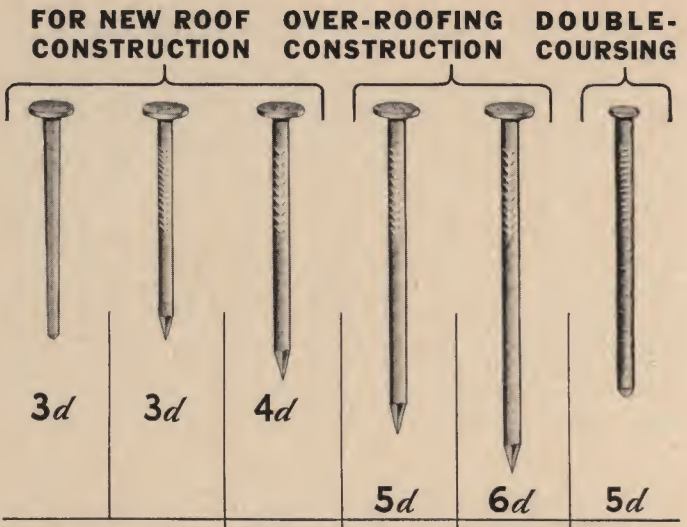
Rust-resistant Nails Must Be Used

Only RUST-RESISTANT NAILS should be used in applying CERTIGRADE shingles. "It's the *coating* that counts." The nails may be of round wire or square cut—this makes virtually no difference, if they are heavily coated with a rust-proof metal. A zinc coating prevents all corrosion, and therefore this type of nail lasts indefinitely. Hot-dipped zinc-coated nails have the strength of steel and the corrosion resistance of zinc, and are therefore emphatically recommended.

Be certain that the type of nail chosen is rust-resistant. The difference in price between a good rust-resistant nail and an ordinary bright or blued wire nail is negligible. A galvanized nail with a rough surface produced by a hot zinc dip is superior to a galvanized nail with a smooth surface. Aluminum nails, properly etched, are now available in all shapes and sizes for the application of CERTIGRADE shingles. As aluminum weighs less than steel and zinc, approximately half as many pounds are required per square.

How to Find Amount of Nails Required

Satisfactory nails of the proper shape and size are available at all dealers. After determining the number of squares to be covered and choosing the weather exposure to be used, refer



FOR 16" AND 18" SHINGLES		FOR 24" SHINGLES	FOR 16" & 18" SHINGLES	FOR 24" SHINGLES	FOR ALL SHINGLES
1¼" LONG	1¼" LONG #14½ GAUGE	1½" LONG #14 GAUGE	1¾" LONG #14 GAUGE	2" LONG #13 GAUGE	1¾" LONG #14 GAUGE
APPROX 376 NAILS TO LB.	APPROX 515 NAILS TO LB.	APPROX 382 NAILS TO LB.	APPROX 310 NAILS TO LB.	APPROX. 220 NAILS TO LB.	APPROX. 380 NAILS TO LB.

SQUARE CUT NAILS OF SAME LENGTH WILL ALSO GIVE SATISFACTORY SERVICE.

STANDARD "BOX" NAILS OF THE SIZES GIVEN WILL PROVE SATISFACTORY IF PROPERLY ZINC COATED OR MADE RUST-RESISTANT.

to the table on page 41 for roofs, or the table on page 64 for side walls. Read the foot-notes under each table.

Use Only Two Nails Per Shingle

To estimate the number and poundage of nails required in applying a shingle roof, allowing two nails per shingle, consult the following table:

Approximate Number Required, and Weight of Rust-Resistant or Zinc Coated Nails Per Square of Random Width CERTIGRADE Shingles, for Weather Exposures Given. See Nail Specifications on page 40.

16-Inch CERTIGRADE	5-Inch Exposure			4½-Inch Exposure			4-Inch Exposure			3½-Inch Exposure		
	Number	Weight		Number	Weight		Number	Weight		Number	Weight	
		Lbs.	Oz.		Lbs.	Oz.		Lbs.	Oz.		Lbs.	Oz.
No. 1 Blue Label Grade	1030	2	0	1144	2	3½	1287	2	8	1471	2	14
Red Label Grade	1310	2	9	1454	2	13½	1637	3	3	1872	3	10
No. 3 Black Label Grade	1545	3	0	1715	3	5	1931	3	12	2206	4	2

18-Inch CERTIGRADE	5½-Inch Exposure			5-Inch Exposure			4½-Inch Exposure			4-Inch Exposure		
No. 1 Blue Label Grade	933	1	13	1030	2	0	1144	2	3½	1287	2	8
Red Label Grade	1190	2	5	1310	2	9	1454	2	13½	1637	3	3
No. 3 Black Label Grade	1348	2	11	1545	3	0	1715	3	5	1931	3	12

24-Inch CERTIGRADE	7½-Inch Exposure			7-Inch Exposure			6½-Inch Exposure			6-Inch Exposure		
No. 1 Blue Label Grade	716	1	14	760	2	0	784	2	1	852	2	4
Red Label Grade	885	2	5	945	2	7½	974	2	9	1060	2	12
No. 3 Black Label Grade	955	2	8	1020	2	10½	1052	2	12	1245	3	0

Note: The above figures are for new roofs, on slat or solid decks. For over-roofing, as larger nails are used, increase weight of nails needed two-thirds for 16-inch and 18-inch shingles and three-fourths for 24-inch shingles. The above table allows a reasonable wastage of nails, and fewer nails may be needed on some jobs.

Recommended Practices in Applying CERTIGRADE Shingles on Roofs

THE first course of shingles at the eaves should be at least doubled, as the obvious minimum requirement of good practice. All shingles when laid on the roof should be spaced apart at least ¼ inch, and only *two* nails should be used for each shingle. The proper placing of these two nails is an important matter. They should be near the butt line of the shingles in the next course that is to be applied over the course that is being nailed, but should never be driven below this line so that they will be exposed to the weather. Good practice is ¾ inch to 1½ inches above the butt line, with 2 inches above as an allowable maximum. Furthermore, each nail should be placed *not more than ¾ inch* from the edge of the shingle at each side. When nailed in this manner, the shingles will lie flat and will give maximum service. To repeat: regardless of the width of the shingle, only *two nails* should be used. Never drive nail heads into the wood, crushing it. Hold that last blow!

Proper Side Lap Is Imperative

The second layer of shingles in the first course should be nailed over the first layer in such a way that the joints in each course are not less than 1½ inches apart. This is the minimum "side lap" that is allowable, and if possible the joints should be "broken" by a greater margin. A triple layer of shingles in the first course is highly recommended for all first class work. The additional cost is negligible, and a triple layer is absolute insurance against leaks at the cornice, which is an important matter when a box cornice is used.

Joints Must Be Broken

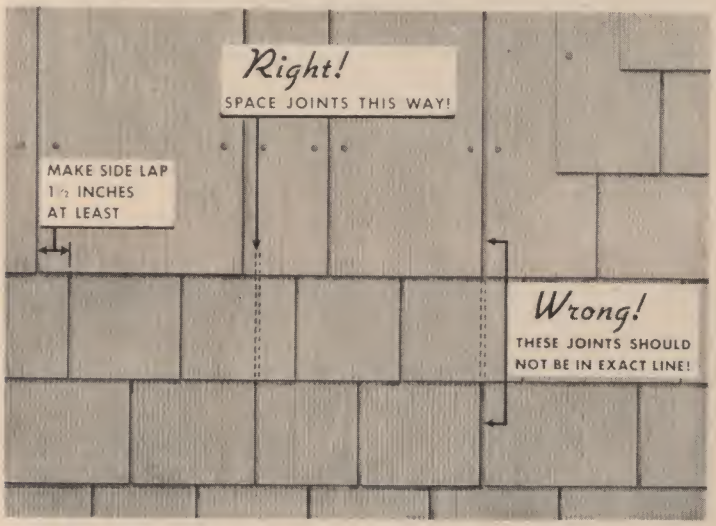
The joints in all three layers of shingles in the first course should be "broken"; that is, they should not match up in any of the three courses. The butts of the shingles should project from 1 to 1½ inches from the first roof board, so that rainwater will be spilled into the gutter or to the ground without working down on the side of the building.

The second course, using the exposure recommended in this handbook (see page 28) should now be begun, the exposure being measured from the butts of the shingles in the first course. Some carpenters prefer to use a strip of lumber as

a straight-edge against which to lay the shingles; others prefer to strike a chalk line and shingle to the line. Expert shinglers can often do a good job with only occasional reference to a line, using the blade of the shingling hatchet as a means of measuring the length of the exposure.

Joints in Alternate Courses

In applying successive courses, great care should be taken to insure the proper side lap, so that the joints will be at least 1½ inches apart in *adjacent* courses, and so that joints in *alternate* courses do not exactly "line up." If attention is given to

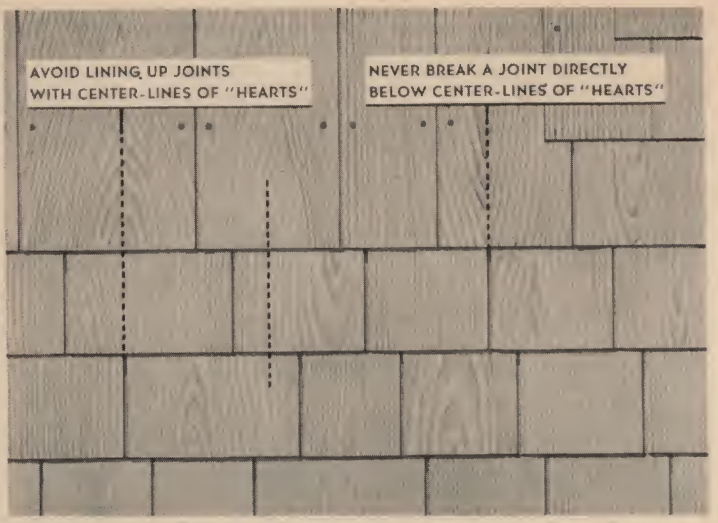


● The correct side lap and proper breaking of joints is important, but easily accomplished.

this matter, leaks in a shingle roof are a remote possibility, for when shingles are laid with the recommended exposure (as, for instance, 5 inches for 16-inch shingles) there are *three* layers of very durable wood in the roof at every point.

Watch Heart-Centers!

In laying Red Label and No. 3 Black Label shingles, which are mixed flat and vertical grain, the joints in the course below should



● Flat-grain shingles in Red Label and No. 3 Black Label grades should be properly applied as shown above.

never be directly below the "heart-center" or the center line of the flat grained shingle that is being nailed in the course above. Wide flat grained shingles of the lower grades, if entirely flat grained, should be split so that no shingles of this kind wider than 8 inches will be found in the roof. In laying No. 1 all-heartwood edge-grain shingles, no splitting of shingles is necessary, and such shingles can be laid with maximum speed.

The good shingler will use care in breaking the joints in successive courses carefully, so that they do not match up in three successive courses. This seems more difficult of accomplishment than it really is, especially in the laying of No. 1 Blue Label CERTIGRADES. In laying roofs with No. 3 Black Label shingles, this close attention to detail, due to the narrower widths, may seem to require too much time, but as shingling progresses, avoidance of the "lining up" of joints in the second course below, as well as in the first course below, becomes almost automatic.

Shingle Away From Valleys

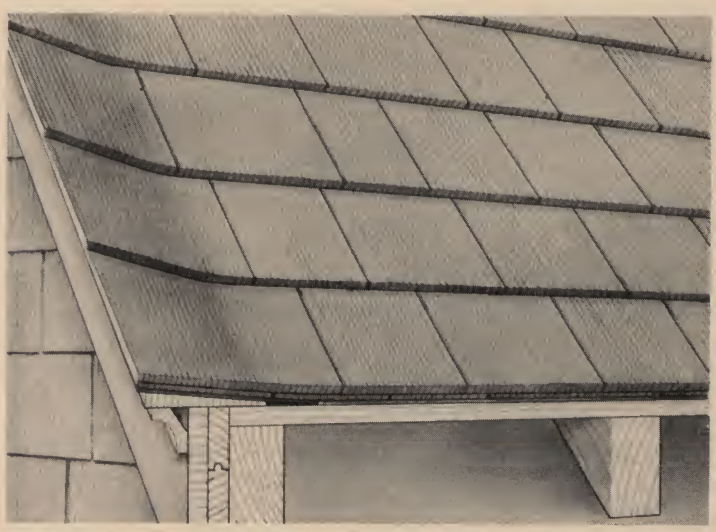
In shingling a roof section that terminates at one edge in a valley, the shingles for the valley should be carefully cut to

the proper miter at the butts and should be nailed in place first, so that the shingling is directed *away* from the valley. This makes it possible to use carefully selected shingles for some little distance away from the center line of the valley, and avoids the introduction of broken joints into the valley.

Drip From Gables Can Be Prevented

At gables, the shingles should project from 1 to 1½ inches over the end rafters or barge boards and mouldings. A length of 6-inch cedar bevel siding nailed along the edge and parallel with the end rafter, with the thinner edge of the siding inward, can be used to give the shingles a slight tilt away from the edge of the gable. The butts of the shingles which rest on this strip of siding may be cut back to produce a slight slant, so that drainage will be away from the gable edge along the slanted butts. This will prevent drip from the gable and the formation of icicles during cold weather.

If the shingles are being applied on a "solid deck," it is a good plan to measure back from the ridge at intervals, so that errors in the alignment of the courses can be corrected by adjustments that will not be discernible to the unaided eye, and



● Drip from gables and the formation of icicles can be prevented by this simple expedient.

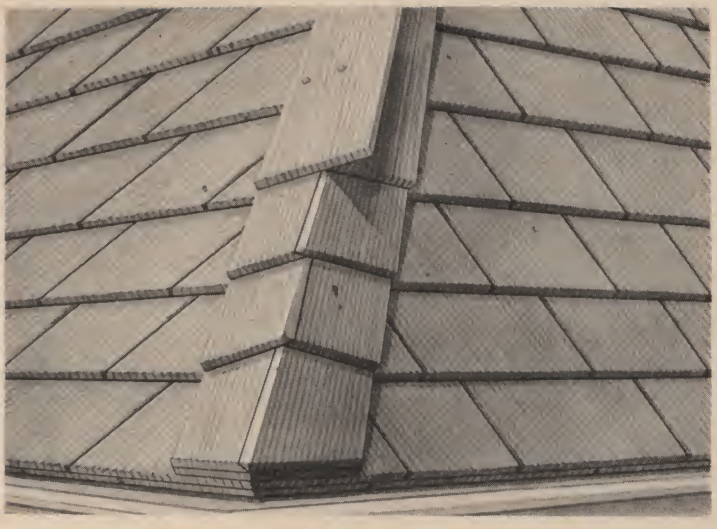
to make certain that the last or final course at the ridge will leave shingles of the proper length of butt exposure. As the last course is nailed in place, that portion of the shingles projecting beyond the center line of the ridge should be sawed off.

How to Apply Shingled Hips and Ridges

Hips and ridges seldom cause much trouble from leakage, for the rainwater drains away from the center line as fast as it falls, unless it is driven by a high windstorm. However, good tight hips and ridges are advantageous in avoiding air-infiltration and a consequent partial loss of the great benefit of the high heat insulating value of a good CERTIGRADE shingle roof. One type of hip that is sometimes used, especially in conjunction with hip flashings over the ridge boards, involves the lacing of the shingles as they meet at the center line of the hip, alternate shingles being edged or slanted toward opposite sides of the roof. Such hips are not desirable, as they involve the use of exposed nailing.

The Modified "Boston" Hip Is Best

The best practical type of construction is the modified "Boston" hip or ridge with nails not exposed to the weather. In constructing this type, shingles of approximately the same width should be sorted out—for a 5-inch exposure roof, they should be 6 inches wide or wider and strictly vertical grain. Two lines are now marked on the shingles on the roof 5 inches back from the center line of the hip (or ridge), one on each side. (On small houses, hips may be made narrower, the two lines being spaced 3 inches back from the center line instead of 5 inches.) The first shingle of the hip to be laid should be sawed across the butt so that the edge of the butt will be parallel with the butts of the shingles in the first course of shingles at the eave line. It should then be nailed in place with the lower edge extending along the line previously marked off on that side, the nails being placed so that they will be covered by the next shingle applied with the same exposure as that used on the roof. One edge of this shingle will now project above the center line of the hip (or ridge). This edge should be carefully cut back (not split back) to the hip (or ridge) line, the cut being slanted so that the plane surface of the edge that is left is parallel with the face of the roof on the opposite side of the hip (or ridge). The shingle on the opposite side of the hip (or ridge) should now be applied in the same



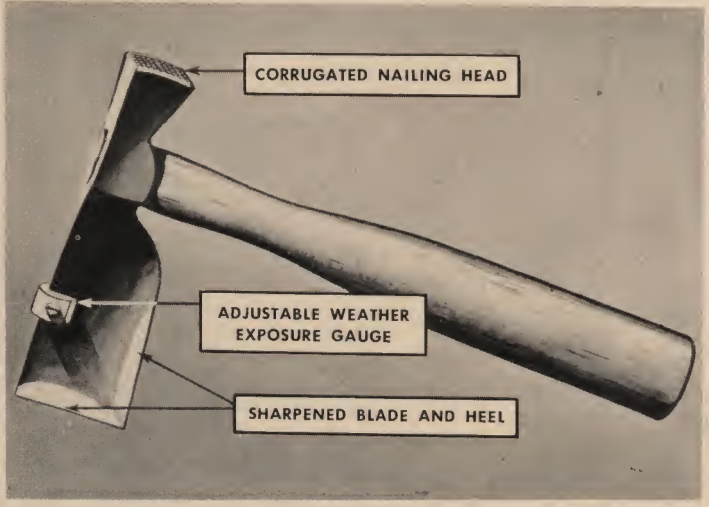
● How the recommended modified "Boston" hip is made.

manner, the projecting edge being cut back so that it slants in a direction parallel with the face of the roof on the side to which the first shingle was applied. The next two shingles are now applied, but in *reverse* order, so that the final trimmed-off edge slants in a direction opposite to that of the first exposed edge. This alternate beveling of the edges to the right and to the left produces a hip that is weather tight and durable. The starter course and end course of a ridge may be doubled, ending the ridge with the butts of the ridge shingle towards the gable end. It is also good practice to begin hips with the shingles doubled in the starter course. The architectural effect that is obtained is very pleasing, and the cost of this type of hip, or ridge, is very low. Good work can be done by the novice, if a little care and attention to details is observed.

Factory-Assembled Hip and Ridge Units

Much time may be saved by using pre-cut hip and ridge units, which consist of two factory-assembled shingles cut to the proper miter to fit the angles formed at hips and ridges by various roof pitches. They eliminate the necessity of trimming on the job, and are rapidly gaining in popularity.

● Mitered and stitched to accommodate different roof pitches, factory-assembled hip and ridge units are time-savers.



● Professional shingle applicators use a special type of shingling hatchet which is designed to speed application.

● Nails should never be more than 2 inches above the butt-line of the next course.

Never Soak CERTIGRADE Shingles Before Laying

When a car arrives at the yard of the retail dealer and the shingles are placed in storage, they quickly reach a moisture content or "hygroscopic balance" by absorbing moisture from the air, that depends upon prevailing atmospheric conditions in that particular locality.

Shingles should not be wetted before they are laid on a roof, but should be at the average moisture content that the bundles will reach while in ordinary storage in the retail lumberman's yard. Proper attention should, of course, be paid to spacing, so that there will be sufficient room for expansion during rainy weather. A space of ¼ to ⅜ inch between the edges of adjacent shingles will allow for this expansion. The best possible moisture content for the shingles at the time of application, based upon an extended series of measurements of shrinkage and expansion stresses between the nails during the course of an investigation in the laboratories of the College of Forestry of the University of Washington, was found to be 15%, so that a range of moisture content between 10% and 18%, the average moisture content that shingles reach in storage, will give the best results. When thoroughly wet or green shingles are nailed on a roof, splits and checks may occur, due to the shrinkage stresses which develop between the nails.

● Homes of all sizes and architectural designs are colorful and attractive with Certigrade shingles on roofs and machine-processed cedar shakes on side walls. The stained shingles on the roof of this lovely residence complement the walls, which are of shakes applied

double-coursed over unstained shingles. Note the rugged beauty of the walls—heavy shadow lines separating unbroken horizontal expanses achieved by the closely-fitting edges of the shakes. Cedar lends personality and charm to home exteriors.

Over-roofing with CERTIGRADE Shingles

Do Not Remove Old Wood Shingles

IN APPLYING a new roof, it is wasteful and unnecessary practice to strip off the old shingles. These should be left in place, and covered with the new shingles. The result is double insulation against heat transmission, with a consequent saving of fuel during cold weather. This saving often reaches such proportions that in a few years the price of the new roof has been absorbed. Moreover, the double roof that results is considerably stronger than the old single roof, so that a heavier snow load can be carried. This added strength is a result of the increased thickness of the roof, which is accompanied by a corresponding "bridging" effect in the shingles. Consequently, the bending stresses which develop in the rafters when the roof is subjected to heavy snow or wind loads are considerably reduced. Attempts to measure this added strength have, of course, given variable results under different conditions, but a gain in absolute strength of more than seven pounds per square foot of roof surface represents a minimum figure. It will be noted that this gain is not accompanied by much increase in the dead weight of the roof, for a square foot of shingles weighs less than 2 pounds. Furthermore, it is an interesting fact that wood shingles constitute the only form of roof covering that actually *adds* to the strength of the roof section. All other roofing materials are *surfacing materials only*, and impose a *dead load* on the roof with *no* compensating increase in strength.

How to Over-roof—Beginning at the Eaves

Over-roofing is simple and easy. The first step consists in cutting off the old shingles at the eaves just below the butts of the second course, and removing these. This can be done with hatchet or saw. Some carpenters prefer to drive this first double course of shingles back flush with the eave line, using a short section of 2-inch hardwood notched so that it will clear the gutter, but will engage with the butts of the lower course, and hammering this with a maul, while standing on a scaffold. Cutting back with a hatchet is simplest, for splitting of the shingles as the cutting is done is not a matter of consequence, and the cost of the board to replace these is a very small item.

The second step consists in filling the space left by the removal of the old shingles with a 1x2-inch or 1x4-inch strip, which is nailed flush with the eave line.

● The six simple and easy steps that make a perfect over-roofing job. These are fully described in the text.

1. Cut away the first course of old shingles at eaves.

2. Cut back old shingles about six inches from gable edges.

3. Nail a strip of lumber along gable edges and eaves to replace the old shingles.

4. Replace old ridge shingles with strip of bevel siding, thin edge downward.

5. Place strip of lumber in each valley to separate old metal from new.

6. Apply the new cedar shingles right over the old, using 5d rust-resistant nails.

The third step in over-roofing consists in cutting back the shingles from the edges of the gable cornices for a distance of 2 or 3 inches. In the fourth step, the shingles thus removed are replaced with a 1x2-inch or 1x3-inch strip extending flush with the gable so that the new shingles will have a good strong base where they overhang the gable cornice, and so that the edges of the old shingles will not be visible. As an alternative method, the edges of the old shingles may be sawed off flush with the gable edge, a suitable narrow strip or moulding being nailed to the gable board or facing so that a level surface is provided beyond which the new shingles project slightly.

Install New Valleys

The fifth step consists in placing a strip of lumber in the old valley, partially filling it, and attaching it with several nails. New valley flashings are next placed in position and the actual over-roofing may be started, the old hips being removed as the shingling progresses.

Use Rust-resistant Nails of Specified Length

Usual good practice in laying CERTIGRADE shingles should be followed, but longer nails than are used for a new roof are required. For 16-inch and 18-inch shingles, rust-resistant or zinc clad 5 penny "box" nails or special over-roofing nails 1¾ inches long, 14 gauge, should be used. The use of 6 penny rust-resistant or zinc clad "box" nails or special over-roofing nails 2 inches long, 13 gauge, is required for the application of 24-inch shingles in over-roofing.

Don't Worry About Open Sheathing

The same procedure that is followed in laying shingles on a new solid deck roof structure is used in over-roofing, even though the original shingles were nailed on "shingle lath" or strips. That is, no attention need be given the manner in which the nails penetrate the old roof beneath—whether they strike the strips in the open sheathing or not, for with the larger nails that are used, complete penetration is obtained through the old shingles, and a sufficient number of nails to anchor all of the shingles of the new roof securely will strike the sheathing or nailing strips. The same rules for the spacing of the shingles, the same side lap, and the same placing of the two nails in each shingle prescribed for the shingling of new roofs should be followed.

● In over-roofing, new flashings should be placed around chimneys without removing the old.

Install New Flashings

New flashings should be placed around chimneys without removing the old, liberal use being made of a high grade of non-drying mastic to obtain a good water-tight seal between the brick and the metal. Thimble flashings around pipes, if of tin or galvanized iron, should be renewed. Lead thimbles can often be reused with satisfaction, especially when mastic is used to insure a tight seal between the metal parts. All dormer aprons and side flashings should be renewed, allowing the old flashings to remain in place, but separating the old and the new flashings with bituminous paint so that the new do not come into direct contact with the old.

The Final Step

The sixth step consists in removing the old combs or ridges (unless they were formed by lacing the last course of shingles) and nailing a strip of bevel siding (preferably western red cedar), the thin edge down, along each side of the ridge. This provides a solid surface for the top course and a good base for applying the modified "Boston" type of ridge.

Over-Roofing Over "Composition"

Over-roofing is simple, effective and brings real savings to the owner in lower fuel costs. The new shingles will give fully as good service when applied over old shingles as on new roof decks. In re-roofing houses covered with composition material, whether in the form of roll roofing or imitation shingles, it is best practice to strip this material off. CERTIGRADE shingles can be applied over such materials, but it is best, for the protection of the roof deck, if it contains much sapwood, to rid the roof of such condensing layers.

CERTIGRADE Over-Roofs Do Not "Weep"

Over-roofing with red cedar shingles was first practiced more than forty years ago, and thousands upon thousands of houses over-roofed in this manner can be found in every section of the country. It is a method of renewing a roof that should not be compared with the practice of covering old roofs with non-porous, heat-transmitting composition materials. Such non-porous roofings permit the accumulation of condensed moisture beneath them. This condensation, or "weeping" into the roof deck below, sometimes results in the rapid decay of the roof deck and even actual weakening of the rafters—especially in finished attics where proper ventilation has not been provided. This condition is too often only exposed after a structure has failed during a storm, when irreparable damage has been done to the building and contents.

No Debris From Over-Roofing; No Rain Damage

In over-roofing barns and farm structures, it is well to note that this can be done at any season of the year. There is, furthermore, no chance for nails or debris to fall into hay in lofts or into grain bins. The fact that in over-roofing residences, no fear of damage from sudden rain-storms need be anticipated while shingling is an advantage that is of especial importance to home owners.

Moss Does Not Interfere with Over-Roofing

If an old roof is covered with moss, this should be removed by using a stiff wire brush before the over-roofing is started. No future trouble need be anticipated from the fragments of moss

that may remain in the old shingles cleaned in this way. Control of moss on roofs can be accomplished very readily by spraying the roof with a 10% solution of zinc chloride during dry weather. The moss absorbs the zinc chloride and is killed. Excess moss should of course first be removed. If a good job is done, it need not in all probability be repeated until many years have passed. The use of an unpainted ridge roll of galvanized sheet metal may discourage the growth of moss; rain water evidently carries minute particles of zinc oxide and retards the growth of moss. On long slopes, however, the effect of the metal at the ridge may not extend the full length of the slope.

Moss does not injure a CERTIGRADE shingle roof unless conditions are extreme over a long period of time, but as dry moss is inflammable, it is good practice to prevent its accumulation.

On old roofs covered with shingles other than red cedar shingles, decay under mossy areas may be encountered. Such decayed shingles should be removed before over-roofing. They can be economically replaced with Red Label or No. 3 grade CERTIGRADE shingles before the new over-roof is applied.

In designing a building, porch roofs should be given as steep pitch as possible, to provide good drainage. Lack of proper drainage, with the consequent retention of moisture, favors the accumulation of moss on roofs of any type, especially when shade retards the rate of surface drying.

Vents, Louvres and Air Circulation

CARE should be exercised in the architectural design of houses to provide means for ventilating all enclosed areas at will, either through the use of vents, louvres or windows. In hot weather, provision for such ventilation assures greater comfort, and in climates where sudden changes in weather conditions occur frequently, provision for ventilation to avoid too high humidities in enclosed spaces is distinctly necessary, regardless of the form or type of roof construction employed. Porch attics, if left unvented, are apt to be a source of trouble. All such attics should be well ventilated, escape vents being placed near the tops of the gable ends or near the highest points reached by the rafters, with entrance vents in the ceilings, which can be concealed by fascia or cornice boards. These openings should be provided with screens, to prevent the entrance of birds. CERTIGRADE

● All porch attics should be properly vented and screened. Due to the relatively low pitch of most porch roofs, a reduced exposure of the shingles is often necessary. On page 28 recommended exposures for various roof pitches are given.

shingle roofs can withstand the effects of improper construction and lack of ventilation better than all other materials, but nevertheless, proper practice is always advisable. It is well to avoid the enclosure of spaces under dormers and behind the lower or side slopes of Mansard roofs, as well as gambrel roofs, from the standpoint of ventilation as well as other well-known objections that do not call for discussion in this handbook. Ventilation of enclosed areas under roofs of churches, school buildings and elevators is especially important, for such buildings are not, as a rule, evenly and continuously heated during the winter months.

Roof Staining and Stained Shingles

THE GREATER proportion of the roofs constructed of CERTIGRADE shingles are left unstained, as the natural preservative in western red cedar wood insures very long life, and the shingles weather to a neutral color, subdued in tone, that enhances the architectural beauty of any building. The random width shingles also avoid the harsh, mechanical effects produced by other less effective roofing materials.

Some home owners prefer colored roofs, however, and these can be obtained either through (1) the use of pre-stained shingles, or (2) staining on the roof.

Pre-Stained Shingles Should Have CERTIGRADE Quality

Stained shingles are usually colored by immersing each individual shingle in a bath of stain, with or without the use of pressure. The shingles are then allowed to drain, and the stain is either permitted to dry in a normal manner, or is rubbed into the surface of the wood by mechanical means. In some instances, double staining processes are employed. The quality of the stain used, and the character of the pigment employed has a great bearing upon the lasting qualities of the stain. In buying stained shingles, it is desirable to obtain assurance that the shingles that have been stained are CERTIGRADES and to consider carefully the reputation of the company producing the stained shingles, as an assurance of quality of stain and the use of proper staining methods.

Advantages of Stained Shingles

The stained shingles offer, as an advantage, (1) a choice of color or color combinations; (2) a reduction in the rate of expansion and contraction of the shingles; (3) a reduction in the rate of mechanical wear of the surface of shingles. Shingles that have been on roofs for fifty years or more are somewhat thinner than when first applied. This is due to mechanical wear, which is a combination of the fretting action of dust particles, lixiviation of the surface layers of the wood through many years of exposure to rainstorms combined with very slow hydrolysis, so that eventually the shingles "wear out." Such effects become apparent only after a great many years of service, if the surfaces of the shingles remain unprotected, but if stained shingles are used, and the

stain on the exposed butt surfaces is renewed at proper intervals, cedar shingles will last—at least from a theoretical point of view —"forever." Most reputable stained shingle companies supply CERTIGRADE shingles, as it is obviously unwise to add the expense of staining to a low grade of shingle. Durability of the color of shingle stains varies, and therefore the reputation and stability of the company is a factor of interest to purchasers of stained shingles.

Staining on the Roof

Staining on the roof after the shingles have been applied may not offer all of the advantages of pre-staining, but is comparatively inexpensive, and can be repeated at low cost when the colors begin to fade or the roof begins to accumulate grime or soot. Although heavy paints are excellent on side walls they should not be used on roofs—they are costly and do not give the best of service and can be applied only with difficulty. Moreover, they increase the differential between the shrinkage stresses in the two sides of the shingles, and are, therefore, as a rule, objectionable. A good shingle stain should be quite thin, so that it can be applied evenly and quickly without leaving sags between the shingles or at the butts where the shingles lap. It should be applied when the shingles are thoroughly dry. Prepared shingle stains are supplied by all reputable paint manufacturers at low cost. Red and brown colors have the best lasting qualities. The use of black paints containing graphite should be avoided. It is well to bear in mind the fact that colors on shingles can be renewed at small cost, in comparing stained shingles with other materials, which become dull, dirty or ugly after a comparatively short period of exposure and which can not be satisfactorily restained.

It is always best to use shingle stains of known performance characteristics formulated by responsible manufacturers, so that good results from the standpoint of appearance as well as lasting qualities will be assured. It is inadvisable to use stains improvised from pigments and non-drying oils, such as lubricating oils of any type. Well manufactured shingle stains are relatively inexpensive, and are stocked by lumber dealers everywhere. They are available in all popular colors and are packaged in large or small containers.

CERTIGRADE Shingle Side Walls

CERTIGRADE shingles are excellently suited for side wall construction and there has been a great increase in shingle side wall application during recent years. When properly applied with rust-proof nails, CERTIGRADE shingles form one of the most durable side walls known. This great durability and the charm and beauty of shingled side walls, coupled with the fact that shingles can be so conveniently used to renew the walls of any house, whether of brick, stucco or any other material, has led to a tremendous expansion in their use for this purpose.

CERTIGRADE Side Walls Are Inexpensive

Side walls of CERTIGRADE shingles, while they present a rich appearance, are actually less expensive than walls of other materials, and this low cost is combined with such high durability that the net cost is probably the lowest that has ever been attained in building construction. One basic reason for this low cost is the fact that on side walls wide exposures are permissible, and are, in many cases, considered to be more desirable than narrow exposures. These wider exposures, of course, mean that fewer shingles are needed to cover a given area of side wall, resulting in greater economy, both in materials and in labor of application.

● The same CERTIGRADE shingles that every home builder can afford are used in building the finest homes where initial cost is a very secondary consideration. CERTIGRADE shingles permit a freer and fuller expression of the ideas and ideals of the architect as well as the discriminating owner.

Tight, Spaced or Sheet Sheathing

In new side wall construction, either tight sheathing or spaced sheathing is used, although tight sheathing is more widely accepted. In mild climates, however, sheathing spaced apart on centers equal to the shingle exposure and shingled with CERTI-GRADES provides a very satisfactory and inexpensive wall. Building paper should be used with such construction, either between the shingles and sheathing or between the sheathing and studding. Not only is spaced sheathing satisfactorily used on residences in mild climates, but it is also effective for use on certain types of garages, implement sheds and other structures where protection from the elements is a major factor.

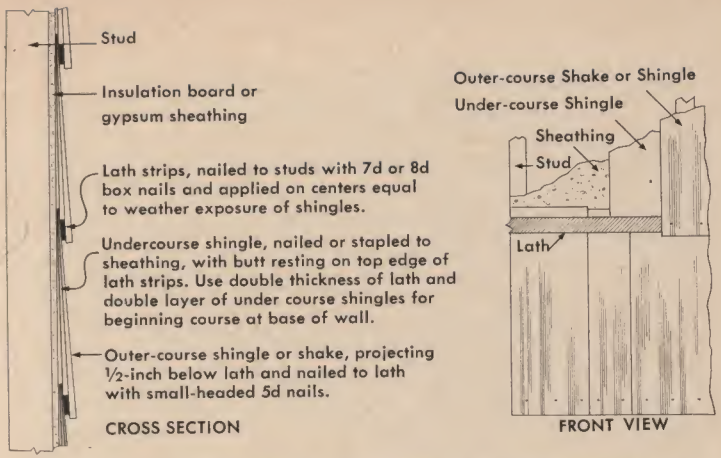
Tight sheathing is preferably applied diagonally, but horizontal sheathing can be used effectively, with "let-in" braces providing added strength. Plywood sheathing is also a most excellent base for shingles.

When gypsum board, insulation board or any other sheet material of adequate strength is used as sheathing, care must be taken to insure that the shingles are firmly and permanently attached to the wall. Several methods can be followed.

Sheathing strips or boards can be applied directly over the non-wood sheathing, the strips being nailed through the sheathing material into the studs and spaced apart on centers equal to the weather exposure to be given the shingles. Each course of shingles then is nailed to a separate strip.

A second method is to use special self-clinching nails or fasteners. These patented fasteners are designed so that they automatically clinch behind the sheathing material when the head is driven flush with the surface of the shingle. Manufacturer's specifications should be followed.

The third technique, which is growing in popularity, is known as the "lath method." Practical only when shingles are applied in double courses, this method involves the use of regular wood lath strips, approximately ⅜"x1⅝"x48". The lath serves as a straight-edge, with the butts of the under-course shingles resting on the lath's upper edge. The outer-course shingles or shakes are positioned so as to project ½" below the lath, and then are nailed to the lath with regular 5d small-headed nails, the lath being nailed to studs through the sheathing with 7d or 8d box nails. (*See application detail on page 63.*) The lath should be thoroughly pre-treated with a solution of pentachlorophenol or creosote. Such treatment of western red cedar lath is unnecessary.



● Lath strips provide adequate nailing base for shingles applied over non-wood sheathing.

Choosing Proper Exposure

In choosing the exposure to be used on a side wall, to obtain the best effect and to avoid as much cutting of the shingles as possible, the butt-lines should be even with the upper lines of the window openings, and also wherever possible, with the lower lines of such openings. It is also better to tack a temporary strip to the wall to use as a guide for placing the butts of the shingles squarely, rather than to attempt to shingle to a chalk-line, when straight shadow lines are desired.

How Corners Are Made

Corners should be neatly made, and this is readily accomplished by "lacing" or placing the corner shingles in each course first, lining up the edges of corner shingles at each course with the faces of the two walls alternately, so that a single line will not be formed. Inside corners can be made by nailing a 1½-inch or 2-inch square strip, S4S, in the corner and jointing the shingles in each course against this strip. Mitered inside corners over a narrow metal flashing strip are usually preferred for wide exposures. (*See illustration on page 65.*)

How to Find Amount of Nails Required

The following table indicates the number of pounds of rust-resistant or zinc clad nails required for the application of shingles on side walls, with various exposures given.

Approximate Number Required, and Weight of Rust-Resistant or Zinc Coated Nails Per Square of Random Width CERTIGRADE Shingles When Applied to Side Walls, for Weather Exposure Given. Read Note Below Before Using Table!

16-Inch CERTIGRADE	5½-Inch Exposure			6-Inch Exposure			6½-Inch Exposure			7-Inch Exposure			7½-Inch Exposure		
	Number	Weight		Number	Weight		Number	Weight		Number	Weight		Number	Weight	
		Lbs.	Oz.		Lbs.	Oz.		Lbs.	Oz.		Lbs.	Oz.		Lbs.	Oz.
No. 1 Blue Label Grade	933	2	7	852	2	4	784	2	1	735	1	15	680	1	13
Red Label Grade	1190	3	2	1060	2	13	974	2	10	914	2	7	851	2	4
No. 3 Black Label Grade	1348	3	9	1245	3	4	1150	3	0	1044	2	12	945	2	8

18-Inch CERTIGRADE	6-Inch Exposure			6½-Inch Exposure			7-Inch Exposure			7½-Inch Exposure			8-Inch Exposure		
No. 1 Blue Label Grade	852	2	4	784	2	1	735	1	15	680	1	13	628	1	11
Red Label Grade	1060	2	13	974	2	10	914	2	7	851	2	4	785	2	10
No. 3 Black Label Grade	1245	3	4	1150	3	0	1044	2	12	945	2	8	845	2	6

24-Inch CERTIGRADE	8-Inch Exposure			9-Inch Exposure			10-Inch Exposure			11-Inch Exposure			12-Inch Exposure		
No. 1 Blue Label Grade	619	1	10	558	1	8	502	1	5	456	1	3	405	1	1
Red Label Grade	745	2	0	692	1	13	620	1	10	565	1	8	515	1	6
No. 3 Black Label Grade	798	2	2	745	2	0	672	1	12	610	1	10	558	1	8

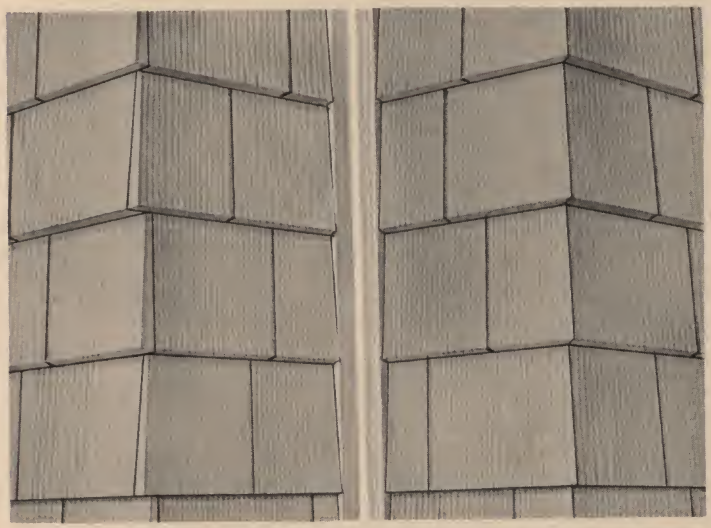
Note: The above figures are for butt-nailing of new double-coursed side walls, using small-headed 5d nails. For the weight of 3d nails to hold the under course in double coursing, one nail per shingle, use one-third of the above weights. For single coursing with 3d nails, subtract one-third from the above weights. For over-walling with 24-inch shingles, add one-half to above weights. Remember that a 12-inch exposure will require half as many nails as a 6-inch exposure, a 14-inch half as many as a 7-inch, and so on. Nail specifications are given on page 40.

Two Methods of CERTIGRADE Side Wall Application

THERE ARE TWO general methods of applying shingles to side walls—single-coursing and double-coursing. Each method has features which commend its use, single-coursing being the older and more traditional method, while double-coursing is newer and perhaps more popular as it conforms so well with present-day architectural trends.

Single-Coursing of Side Walls

THE SINGLE-COURSING METHOD of shingle side wall application is quite similar in its general aspects to shingle roof application, the major point of difference being in the exposures employed. In roof construction, maximum permissible exposures are slightly less than one-third the shingle length (e.g., 5″ for 16″ shingles), to produce a three-ply covering. The vertical surface of a side wall, however, presents less of a weather-resistance problem than does the pitched surface of a roof, and accordingly a two-ply covering of shingles is adequate on an exterior wall. In single-coursing, the weather exposure of the



● Several methods of making corners. Left: a "laced" corner; right: a mitered corner; center: shingles jointed against square strip to make inside corner.

shingles should never be greater than half the length of the shingle, minus ½ inch, so that two layers of wood will be found at every point in the wall. For example, when 16-inch shingles are used, the maximum exposure should be ½ inch less than 8 inches, or 7½ inches. The maximum exposure for a single-coursed side wall of 18-inch shingles is 8½ inches, and for 24-inch shingles it is 11½ inches.

Single-coursed CERTIGRADE side walls feature concealed nailing, the same as in proper shingle roof construction. This means that the nails should be driven approximately one inch above the butt line of the succeeding course, so that the shingles of this course will adequately cover them. Two nails should be driven in each shingle up to 8 inches in width, each nail placed about ¾ inch from the edge of the shingle. On shingles wider than 8 inches, a third nail should be driven in the center of the shingle, at the same distance above the butt line as the other nails. Rust-resistant nails should be used, 3d size, 1¼ inches long.

The lowest or starting course at the base of the wall should be doubled to introduce the proper tension in the succeeding courses. The joints between shingles in adjacent courses of a single-coursed wall should be "broken" or kept out of vertical alignment at least 1½ inches. The joints themselves may be either closed or spaced, at the option of the home owner. In the case of spaced joints, where a space of between ⅛″ to ⅓″ is left between shingles, a pronounced effect of individual shingles is produced, whereas when the shingles are laid closely against each other, an unbroken siding effect is achieved. In applying shingles with tight or closed joints, if the edges of some of the shingles, despite the care that is used in manufacture, are not exactly at right angles with the butts and are not strictly parallel, they can be shaved off straight with a knife, or such occasional shingles can be accumulated and trued up on a table saw. In applying shingles with open or spaced joints, these slight variations in parallelism usually need no correction.

Wider Exposures Require Fewer Shingles

Due to the wider exposures that are commonly used, fewer shingles are required to cover a given area of side wall with single-coursed construction than is the case on roofs. This fact should be remembered in estimating costs and quantities. Whereas four bundles are required to cover 100 square feet of roof area, approximately three bundles (the exact coverage depending upon the weather exposure) are needed to cover a square of side wall area.

How to Determine the Quantity of Shingles Required

In estimating the quantity of shingles needed for the side walls of a building, the actual areas to be shingled should be determined by measurement in terms of square feet; window and door areas should be deducted from the total. Then, by consulting the table on page 95, the coverage of one bundle at the exposure to be used (for example, 38½ in the case of one bundle of 18-inch shingles at 8½" exposure), should be divided into the wall area to be covered. The quotient will represent the number of *bundles* required. To this figure, however, add 5% to allow for wastage in cutting and fitting shingles around openings, such as doors and windows, and for the extra shingles needed for the lowest or starter course, which must be laid double. When shingles are applied with tight joints instead of open joints, an additional 3% should be added to the total number of bundles required.

Rebutted-Rejointed and Sanded-Face Shingles

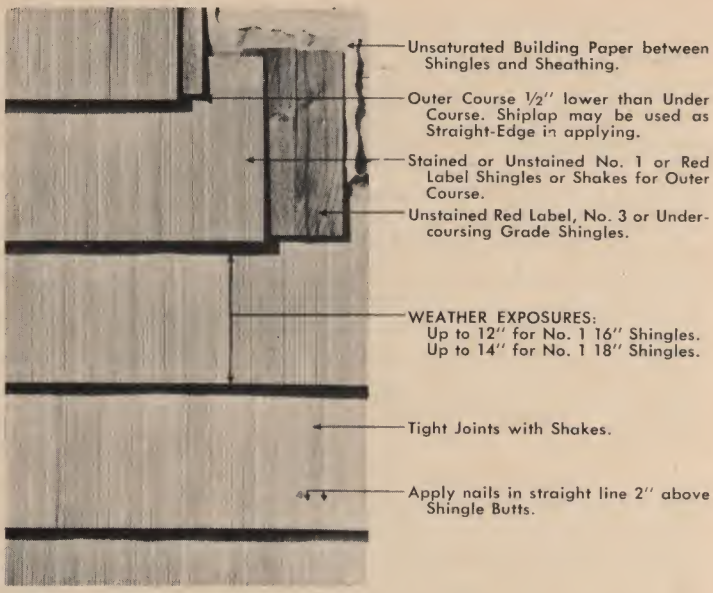
When, to achieve certain architectural effects, it is desired to apply shingles on side walls with closely-fitting edges, the use of rebutted-rejointed shingles often makes possible a substantial saving in time required for application. The edges of these shingles have been trimmed parallel and their butts have been cut at exact right angles to the edges.

Another increasingly popular type of side wall shingle has a smooth-sanded face, in addition to re-trimmed edges and butts. Any saw marks or imperfections are removed in the sanding operation, and yet the surface remains sufficiently textured so that the pleasing rustic appearance which is traditional with shingles is retained, as well as sufficient "tooth" to provide an excellent surface base for staining or painting.

Double-Coursing of Side Walls

THE APPEARANCE of side walls when the shingles are given a very wide exposure, combined with deep shadow lines in the sun, offers such an appeal to persons of artistic temperament that there has been a tremendous increase in the use of CERTI-GRADE shingles in the double-coursed method of application.

The use of two layers per course, one applied directly over the other, affords a side wall of real economy. This economy is due to the wide exposures and to the use of a low-cost shingle for the inner and completely concealed layer.



● Proper application of double-coursed side walls. Use double-coursing nail shown in illustration on Page 40.

Wide Exposures Are Recommended

Although wide exposures imply the use of very long shingles, this effect is obtained in double-coursing by applying doubled layers of regular 16-inch or 18-inch shingles. The maximum exposure to the weather of 16-inch shingles double-coursed is 12 inches, and for 18-inch shingles it is 14 inches. If Red Label grade shingles are used for the exposed course, a maximum weather exposure of 10 inches is practical for 16-inch shingles and 11 inches for 18-inch shingles. The shingles are securely fastened by so-called "butt-nailing," using 5d small headed rust-resistant or zinc coated nails. These nails are driven about two inches above the butt line—one nail about ¾ inch from each edge of the shingle and a third nail in the center of all shingles wider than 8 inches. Additional nails are used to apply processed shakes. Each under course shingle may be held in place with a single 3d nail, or a staple or "stitch" may be used for this purpose.

A piece of shiplap can be used as a guide in laying the shingles. The lowest or beginning course on a double-coursed side wall

should be tripled to introduce the proper tension into the succeeding courses above.

Low-grade shingles are used for the under course, including No. 3 Black Labels or Undercoursing shingles manufactured especially for this purpose (see pages 20 and 21). With half of the shingles on a side wall of inexpensive lower grades, the cost of double-coursing is substantially reduced. These low-cost shingles are completely covered by the outer course shingles and contribute to the insulation, weather resistance and beautiful shadow lines of double-coursing.

Shingles or Processed Shakes for Outer Course

A variety of types of shingles are available for the outer course of double-coursed side walls. Natural CERTIGRADE shingles can be used and can be left to weather with full assurance that good service will result, but they may be painted or stained at any time after they have been applied.

Pre-stained No. 1 or Red Label grade shingles are satisfactory when used for the outer course of double-coursed side walls, in conjunction with unstained shingles of a materially lower grade for the under course. The shingles in the under course are completely covered by the outer course, and consequently natural shingles of a low-cost type are entirely satisfactory for this purpose. Pre-stained shingles, which are available in a wide variety of attractive colors, are particularly suitable and economical for double-coursed side walls as their slightly greater initial cost is reduced by the wide weather exposures used, necessitating fewer shingles, plus the use of unstained under-course shingles.

Processed cedar shakes, usually factory-stained, are one of the most popular types used for double-coursing. These shakes are processed by a machine which produces a rived or fluted effect on one face, the butt and both edges being re-trimmed. As the edges are exactly parallel, these processed shakes can be laid with closely fitting edges and in this way the joints between individual shakes become almost imperceptible. The courses are sharply separated by heavy bands of shadow; this separation, combined with the unbroken horizontal shake surfaces, produces a distinct and beautiful effect.

Look for the CERTIGROOVE Label

Just as CERTIGRADE denotes top-quality shingles, the CERTIGROOVE label on processed shake bundles or cartons testifies to Bureau inspection and grade-marking. Discriminating buyers of shakes invariably make certain that the CERTIGROOVE label is present.

● Processed shakes provide a most attractive design on double-coursed side walls. Note the fluted surfaces, the heavy shadow lines at the butts, and the closely-fitted edges which make imperceptible the joints between shakes. CERTIGROOVE labeled shakes are of top quality.

Double-Coursing Economy

The remarkably low cost of double-coursing may at first glance seem inconsistent with the average prices that a buyer might expect to pay. To illustrate, the following is an example of the savings effected:

	(*Insert Your Dealer's Prices*) *Unstained*	*Stained*
One square, 4 bundles, of No. 1, 16″ Shingles	$.....	$.....
One square, 4 bundles, of Undercoursing, 16″ shingles	$.....	$.....
Total	$.....	$.....
Multiply by 5 (as four bundles laid 5 inches to the weather will cover 100 sq. ft.)	×5	×5
Total	$.....	$.....
Which divided by 12 (12″ exposure) equals:	$.....	$.....
And therefore the cost per 100 square feet (one square) with a weather exposure of 12 inches is	$.....	$.....

Delivered prices vary in different sections of the country due to the differences in freight rates. It will be noted that the computation suggested above is based on 16-inch shingles. If 18-inch shingles are used, the total cost of one 4-bundle square of both the outer and under course shingles should be multiplied by 5½ instead of 5, as 5½-inch exposure is standard for 18-inch shingles on roofs. The resulting figure in this case should be divided by 14 instead of 12, as 18-inch shingles may be applied double-coursed at a weather exposure of 14 inches.

Special Pack for Double-Coursing

Due to the constantly increasing popularity of double-coursed side walls, many pre-stained shingles and processed shakes are packed, bundled or cartoned in so-called side wall-square units, as an aid in furnishing the proper quantity of shingles to cover a given side wall area. Two bundles, or cartons, of these side wall-pack shingles or shakes, when used with a similar quantity of unstained low-cost shingles for the under course, should cover 100 square feet of side wall area at the recommended maximum weather exposure for that particular length of shingle, the maximum exposure for 16-inch shingles being 12 inches and for 18-inch shingles, 14 inches. If the shingles are to be applied at a lesser exposure, additional shingles will be required.

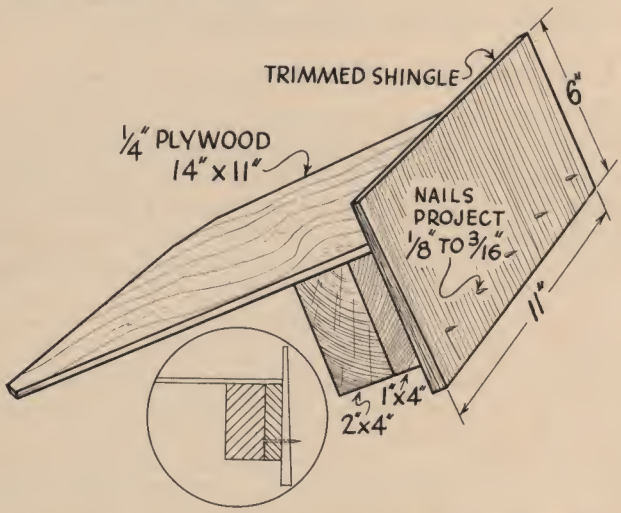
Over-Walling with Shingles or Shakes

CERTIGRADE shingles and CERTIGROOVE shakes may be used to unusual advantage in over-walling and re-styling old houses, regardless of the nature of the existing outer walls. In beginning an over-wall, it is best practice to run a spirit-level line around the building, starting at the highest point of the foundation. This will insure the proper running and spacing of all courses above and below this starting line.

Brick Walls Are Easily Over-Walled

Brick walls, which are often troublesome due to water absorption and infiltration through the brick, are easily covered by furring the walls and applying spaced shingle lath or nailing strips to the vertical furring strips. The furring should be fastened to the window frames and to the wall through the use of anchors or special nails made for this purpose driven between the bricks, so that the outer shingled wall will be well attached. The cost of such over-walling, using double-coursing, can be brought to a remarkably low figure.

● This applicator's platform speeds the construction of double-coursed walls. Quickly moved to the desired position, it eliminates bending or stooping for supply of shingles.



● Assembled from scrap materials found on any construction job, the applicator's platform is simple and easy to build.

● In over-walling over stucco, nailing strips should first be nailed over the wall to provide a good base for the shingles.

Over-Walling Hides Unsightly Stucco

The application of shingles or processed shakes to old, cracked, leaky and unsightly stucco walls is a simple matter. Here the nailing strips should be attached with nails long enough to penetrate the stucco and the underlying sheathing. It is not desirable practice to apply shingles directly to the old stucco, as this material is too weak to provide the proper support for the nails used in shingling. Stucco can often be easily and inexpensively removed. New paper can then be applied to the walls and the shingling can proceed as in new construction.

Over-Walling Increases Selling Prices of Houses

On old wood walls, regardless of their type (bevel siding, novelty siding or wide clap boards) the shingles can be applied directly as on new sheathing, using 6d rust-resistant or zinc-coated nails when "butt-nailing" in double-coursing. Various combinations of single and double-coursing can often be used to very great advantage in giving new lines to an otherwise outmoded structure. The low cost of this type of modernization, whereby an old house of low sale value can be converted into one that attracts the

buyer, has been of real interest and advantage to mortgage investment bankers, the real estate departments of insurance companies, trust companies and other organizations of similar character which are always confronted with the problem of disposing of holdings that consist of older houses requiring modernization.

The life of shingled side walls is so great that it is seldom, indeed, that over-walling over such side walls is done. Nevertheless, in re-styling houses, the application of new shingles may be desirable. In this case, the outer courses, either single or double, can be applied directly over the old shingles, the only precaution necessary being the use of 5d 14 gauge rust-resistant or zinc coated "box" nails or small headed nails for double-coursing and "butt-nailing" of the usual type.

In over-walling around windows and doors, if the old casings are thinner than the new wall, moulding strips should be nailed flush with the edges of the old casings, to which the shingles should be jointed. New flashings should be applied over window and door heads, bringing these out nearly flush with the outer edge of moulding strips, if these are necessary.

Staining or Painting Side Walls

WHILE the use of the best grade of shingle stain is recommended for roofs, side walls of CERTIGRADE shingles may be either *stained* or *painted.*

Cedar Wood Holds Stain or Paint Better

Stain or paint lasts definitely longer on a surface of western red cedar wood than on most other woods, and from this standpoint it is in the very topmost rank of all commercial softwoods. There are apparently no components in the wood which react unfavorably upon paint coatings, and the low rate of expansion and contraction operates to keep paint films intact over long periods of time.

Stained or painted CERTIGRADE shingle side walls are both beautiful and durable. To secure the most satisfactory paint job use pure white lead in oil or the highest grade mixed paint—available in white and many colors. Select a brand of highest quality sold by a reliable retailer. Each coat of paint should be well brushed out and plenty of time allowed for drying between coats. Manufacturers' painting directions, shown on the labels of the original packages, should be carefully followed.

Color Changes Are Easily Made

In re-painting CERTIGRADE shingles on side walls, a complete change of color can be effected simply by choosing the color of paint that is desired. Many other side wall materials can not be painted or re-stained in a satisfactory manner. If the old stain or paint is dark in color and it is considered desirable to change to a lighter tint, two coats, using aluminum paint as the first coat, may be applied. Paints compounded by responsible manufacturers are usually preferred by professional painters who must guarantee quality as well as fine appearance, and white lead paints, which are known to give excellent service on shingle side walls, are now available in colors. Paint can easily be applied to CERTIGRADE shingles by either spray or brush methods.

Edge-Grain and Flat-Grain

GRADE No. 1 Blue Label CERTIGRADE shingles are those in which the grain is vertical, frequently known as "edge-grain." Such shingles are characterized by great resistance to splitting and warping.

What "Edge-Grain" Means

The term "edge-grain" is applied to shingles in which the faces are approximately parallel with planes projected from the pith

● The Staggered Roof is a pleasing type of construction that is easily applied. Standard types of random width CERTIGRADE shingles are used.

of the log to the surface, radiating like spokes in a wheel, as viewed from the hypothetical end of a log. The flat faces of such shingles are therefore parallel with the "pith rays" or the medullary rays of the wood. A shingle of wood cut in this manner therefore consists of alternate bands of spring wood and summer wood, crowded together and running in the same direction as the longitudinal face of the shingle, with the wood rays acting as keys to bind the wood together. As spring wood shrinks, or expands, less than summer wood, the total shrinkage, or expansion, across the face of such a shingle is reduced to a minimum, and as wood cells do not shrink longitudinally to the same extent that they shrink in the other two directions, the rays further resist the shrinkage or expansion in the width of the shingle, for in the rays the longitudinal axes of the individual cells extend in a direction at right angles to the parallel edges of the shingle.

Edge-grain shingles include all shingles in which the annual rings, as viewed in the butt end of the shingle, are approximately at right angles to the face of the shingle. If this angle is greater than 45 degrees, the shingle is classified as "flat-grained."

Comparative Tests of Edge-Grain and Flat-Grain

Comparative tests on western red cedar, made in the laboratories of the College of Forestry at the University of Washington on wood of average quality selected at a typical shingle mill in the vicinity, gave the following results:

	Flat-Grain	*Edge-Grain*
Tension perpendicular to grain, pounds per square inch at 5.8% moisture content	347	616
Cleavage strength (resistance to splitting, pounds per square inch at 7% moisture content)	225	292

It is obvious, on the basis of the above tests, with the lower shrinkage and expansion rate of edge-grain shingles, that the force produced by shrinkage or expansion required to split or pull an edge-grain shingle apart will be very much higher, and therefore narrower widths of flat-grained shingles are advisable.

Shingles should always be cut in such a manner that their flat sides are parallel with the main axis of the log, to avoid "cross" grain, which is defined as a defect in the official grading rules of the Red Cedar Shingle Bureau.

The Natural Color of CERTIGRADE Shingles

THE heartwood of western red cedar exhibits interesting variations in color, ranging from a light straw yellow to a darker reddish brown. This color variation, coupled with the pleasing texture of a roof when CERTIGRADE shingles are laid in random widths, completely avoids the monotonous factory-like repetition in design that characterizes all substitute roofing materials, including attempted "imitation" of wood shingles.

Light Colored Wood and Dark Wood Equally Valuable

Very little basic information about the causes which produce these natural variations in the color of western red cedar wood is available, but they are presumably due to differences in the physical and chemical properties of the soil in which the trees are rooted, combined with variations in the soil moisture content and the rate at which photosynthesis in the leaves produces food material as compared with the transpiration rate in individual trees. The amount of coloring matter present in western red cedar bears no relationship to the durability of the wood in resisting the attacks of fungi. Compared on the basis of color alone, dark-colored wood and light-colored wood are equally resistant to decay. The subject of color variation in western red cedar wood has been very carefully investigated. When left in its natural state, the heartwood of western red cedar shingles weathers to a pleasing color that is much appreciated by artists and architects.

Durability of the Wood of CERTIGRADE Shingles

WESTERN red cedar is famous for its great durability, or resistivity against decay-producing organisms. The precise reason for this unusual durability has not, as yet, been completely determined.

Cedar Contains Natural Wood Preservative

Chemical analyses, made in the United States Forest Products Laboratories at Madison, Wisconsin, of the substances that can be derived from western red cedar sawdust upon prolonged extraction with hot water, have disclosed the presence in the extract of very effective fungicidal thujaplicins as well as two phenols

● A small section of a CERTIGRADE edge-grain shingle enlarged 300 times. The dark globules are natural wood preservative.

which are highly toxic to wood-attacking fungi. It is interesting to note that wood gutters made of less durable wood than western red cedar have a greatly extended life when used in conjunction with a red cedar shingled roof, and that cedar wood, when placed in close contact with other wood of a less durable nature, sometimes affords a measure of protection to such wood.

Dark-red oil globules are distributed uniformly throughout the wood of western red cedar. These gobules apparently act as reservoirs of preservative material which is highly toxic to wood-attacking fungi. This may account in a great measure for the high resistance to decay that this wood exhibits over very long periods of time, and is apparently the source of the pleasant, agreeable odor of freshly cut western red cedar wood.

Heartwood of Cedar Is Impermeable

The heartwood of western red cedar is very impermeable to liquids, and it is difficult to inject oily materials into the wood. This refractory behavior may further explain its ability to give good service under adverse conditions.

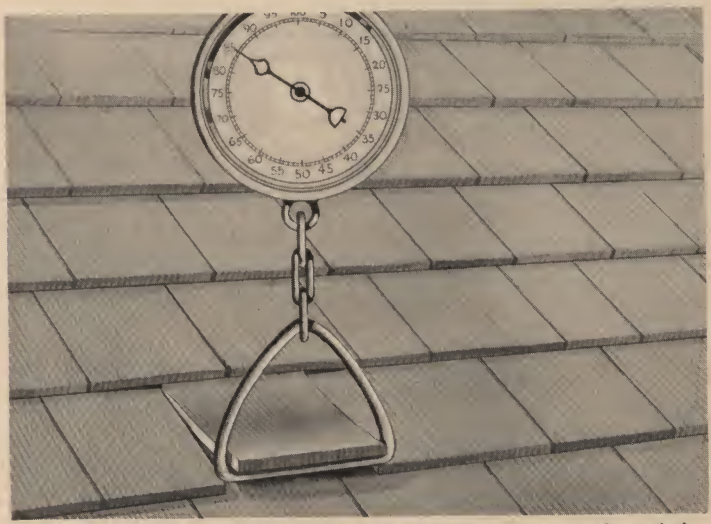
Storm and Hail Resistance of CERTIGRADE Shingles

COMPLETE immunity from storm damage, from a practical point of view, can be obtained through the use of CERTIGRADE shingles when these are applied in the usual way, with the recommended weather exposures, or less, using rust-resistant or zinc coated nails.

Tests Prove Wind Resistance of CERTIGRADE Shingles

To lift a shingle 8 inches wide away from a roof covered with No. 1 16-inch shingles laid with a five-inch exposure requires a pull of 85 pounds—a force so much greater than a hurricane can exert that it can be conservatively stated that properly nailed shingles simply cannot be blown from a roof.

When whole buildings are wrecked by storms, a properly nailed roof of CERTIGRADE shingles frequently remains almost completely intact. The accompanying photograph shows a roof that sailed through the air for a distance of almost a thousand feet when the barn which it covered was demolished by a



● A force of 85 pounds is required before a properly nailed CERTIGRADE shingle of average width can be pulled from a roof—here is REAL wind resistance!

● A tornado wrecked the building, but the CERTIGRADE roof was still good!

tornado. The owner later jacked this roof up where it fell, put posts under it and used it as a sheep shed. The only repairs that were necessary were to two or three small areas where beams sailing through the air had landed, end on, upon the roof.

CERTIGRADE Roofs Withstand Hail

CERTIGRADE red cedar shingle roofs are able better to withstand hail and windstorms of unusual intensity than other types of roofing. The tough, fibrous texture of cedar practically eliminates the possibility of cracking, splitting, puncturing or similar damage under the stress of the most severe pounding by hail stones or the whipping of high winds.

Freedom from damage by wind and hail is of tremendous im-

portance, for if the roof of a structure fails, household goods, ceilings, walls and floors, as well as other contents, are apt to be seriously damaged. A CERTIGRADE shingle roof is the best insurance against such losses.

Snow and Ice Hazards Are Reduced by Shingles

Snow and ice present a minimum hazard when CERTIGRADE shingles are used on roofs, differing markedly in this respect from roofs covered with "imitation" shingles or other types of roofing. Snow and ice avalanches from such inferior roofs damage shrubbery under the eaves of buildings and have upon many occasions caused serious injuries as well as the tragic loss of human lives. On such roofs, snow guards must always be provided, but are on the other hand wholly unnecessary on most CERTIGRADE shingle roofs. It is only when roofs are very steep, exceeding one-half pitch, that precautionary measures are in order. The slower melting rate of snow due to the superior heat insulating properties of CERTIGRADE shingles, and the tendency of the snow to become "keyed" to the shingles, are apparent reasons for the superiority of such shingles in almost completely eliminating this very real hazard.

● A wind velocity of 136 miles per hour failed to affect in any way a roof panel of CERTIGRADE shingles installed in the test section of Wichita University's wind tunnel!

Noises Are Reduced by CERTIGRADE Shingles

The terrific din and clatter that heavy rainstorms and hail cause in striking roofs surfaced with metal or any type of "rigid" material is avoided when roofs are covered with CERTIGRADE shingles, an advantage that is only secondary to the elimination of the dangerous hazard created when such materials, stripped from roofs by windstorms, fly through the air. CERTIGRADE shingle roofs transmit very little noise, and are *safe*. When used on side walls, tests show that the transmission of noise, as measured in *decibels,* is greatly reduced, due to the discontinuity of the layers of wood, which insures greater privacy as well as relative freedom from the distraction of street noises.

Heat Insulation and Its Importance

FROM two points of view, heat insulation in buildings is of real, everyday importance. If a roof or side wall does not insulate against the transmission of heat in an effective manner, the heat loss through such construction must be continuously supplied, during the cold winter months, by burning the additional amount of fuel that this heat loss represents. In some houses, the cost of this heat loss is equivalent to the cost of a new roof and side walls of CERTIGRADE shingles during every five-year period.

Tests Prove Insulating Properties of Shingles

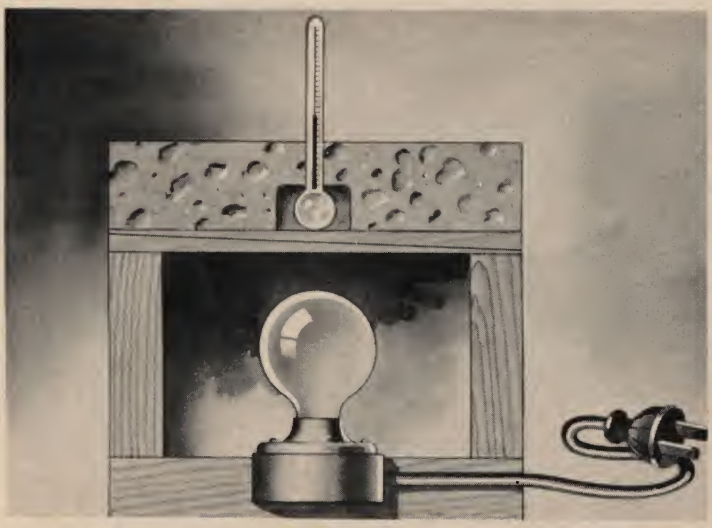
Careful tests made in the laboratories of the College of Forestry of the University of Washington on a roof section of Grade 1 18-inch CERTIGRADE shingles laid 5½ inches to the weather on solid sheathing show a heat transmission rate of only 0.28 B.T.U.'s per degree Fahrenheit of temperature difference below and above the roof. This means that such construction is approximately *twice* as effective in preventing heat transmission as the best grades of ½-inch insulating boards commonly sold for this specific purpose.

During the summer months, when heat in a building is *not* wanted, the heat insulating ability of CERTIGRADE shingles is almost equally important. Bedrooms are cooler, for the roof and walls of CERTIGRADE shingles, instead of absorbing and transmitting the heat into the rooms, ward off the sun's rays. Test boxes designed to show the relative heat transmission of different

materials can be made in the manner shown in the illustration below, and many retail lumber dealers are equipped with these boxes. When two halves of CERTIGRADE shingles are placed on such a box, superimposed in such a way that they equal in thickness only the *thinnest* portion of a CERTIGRADE shingle roof, the rate of heat transmission, as indicated by the rate of increase in the thermometer readings per minute, is so much less than that exhibited by other roofing materials that the comparisons seem almost unreasonable.

CERTIGRADE Shingles Make Air-Conditioning Practical

The need for heat insulation in the home is especially great when air-conditioning equipment is installed. Under such conditions, the power savings during the summer months are fully as important as the fuel savings during the winter months.



● A popular type of apparatus which can be used to show the great superiority of CERTIGRADE Shingles for insulation.

Farm Buildings Need Insulation

Heat insulation in farm structures is of fully as great importance as in homes. Barns, poultry houses and other farm buildings intended for the protection of animals should be well insulated with CERTIGRADE shingles on roofs and side walls. During the cold of winter, animals use up much energy in balancing body heat losses, and this demands more food. Good farm buildings not only reduce the cost of feed, but the animals are kept in better physical condition. CERTIGRADE shingles of western red cedar meet with the approval of agricultural experts, and many tests have been made which show the superiority of red cedar shingles over other types of materials. Additional data on this subject will be supplied upon request by the Red Cedar Shingle Bureau.

Barn Roof Types

● The most important function of farm buildings is to provide shelter for livestock, crops and equipment. This protection comes mainly from the roof and exterior walls.

● As far as the eye can see, CERTIGRADE red cedar shingle roofs dominate the landscape of this, the world's largest housing development. Located in Lakewood, Calif., 486,200 squares of CERTIGRADES were used for the 22,100 homes in this modern community.

● Built in 1660, the John Howard Payne house at Easthampton, Long Island, was immortalized by Payne in the song, "Home, Sweet Home." This all-shingled home is a splendid example of the enduring quality of shingles. In recent years the roof has been renewed with 18-inch No. 1 CERTIGRADES.

Master Specifications for Architects and Builders

•

SHEATHING BOARDS: ROOFERS

(The choice of open or solid sheathing is optional when CERTIGRADE *Shingles are applied. The geographical location of the building will determine the most practical procedure. See pages 31 and 62 of this handbook.)*

(**1**) All sheathing shall be

(Use 2 for open sheathing and 3 for solid sheathing.)

(**2**) Square edge boards 1″ x 3″, 1″ x 4″ or 1″ x 6″, and shall be spaced the same distance apart on centers as the shingles are to be laid to the weather, or 1″ x 6″ shall be spaced on double the weather exposure.

(Use 3 for solid sheathing.)

(**3**) Dressed and Matched or Shiplap cut from 1″ stock and shall be laid solid, or 5/16″ or ⅜″ Douglas Fir Plywood, or ½″ gypsum board.

(Use 4 for BOTH *open and solid sheathing.)*

(**4**) Each board shall be double-face nailed at each end and at each bearing with two 8d nails driven about 1″ from the edges of the boards.

SHEATHING PAPER

(**5**) The outside of all exterior sheathed walls shall be covered with one continuous unbroken layer of rosin sized sheathing paper weighing not less than 20 lbs. per roll of 500 square feet.

(If added insulation is wanted, dry or unsaturated deadening felt, or light-weight "blue" wall board may be specified.)

(**6**) Sheathing paper shall be laid shingle fashion without wrinkles or buckles and with all joints at least 6″ and shall be carried over the studs, jambs, heads and sills of all openings, and no end laps shall occur within 18″ of any internal or external corner.

SHINGLES

(**7**) The Contractor shall cover all roof surfaces (*Specify all other locations, as in 8.*)

(**8**) and all exterior side walls, sides of dormers, gable ends

(**9**) with CERTIGRADE Red Cedar Shingles—bearing the Red Cedar Shingle Bureau's official grade marked label.

(Certigrade Red Cedar Shingles are manufactured in three different lengths: 16", 18" and 24". Three grades in each length—No. 1 Blue Label, Red Label and No. 3 Black Label—are available; the No. 1 grade being the best, and the No. 3 grade being intended for purposes where the presence of defects above the standard weather exposure will not militate against their use. Red Label is an intermediate grade.

No. 1 Blue Label Shingles in each length are strictly vertical or edge-grain, are made exclusively of decay-resistant heartwood, and are entirely "clear." They should be specified for roofs in all first-class construction.

Red Label Shingles may be used to advantage on secondary buildings, and for undercoursing in "double-coursed" side walls.

No. 3 Black Label Shingles may also be used as undercoursing in side wall construction.

The choice of length of the shingles to be used may be determined upon the basis of the architectural effect that is wanted, and the cost that is justified. The longer shingles have thicker butts and are consequently longer lived, although the 16-in. length in the No. 1 grade will give exceedingly good service, and very long life when properly applied according to these specifications.

(Please consult pages 15 to 23 of this handbook, and the official grading rules of the Red Cedar Shingle Bureau for full details. Copies will be furnished promptly upon request.)

(**10**) Shingles for roofs shall be (*Specify grade and length.*)

(**11**) Shingles for side walls shall be (*Specify grade and length.*)

(**12**) Shingles for outer courses shall be (*Specify grade and length.*)

(**13**) Shingles for under courses shall be (*Specify grade and length.*)

(**14**) Roof shingles shall be laid with a weather exposure of (*Specify exposure to the weather in inches from the following table.*)

(*In general the lowest pitch used in the roof will govern, although certain instances may permit two different weather exposures for separate parts of the same roof.*)

Pitch of Roof			*Exposure of Shingles in Inches*		
Pitch	*Rise (in inches)*	*Run*	*16*	*18*	*24*
1/8	3	12			
1/6	4	12	3¾	4¼	5¾
5/24	5	12			
1/4	6	12			
1/3	8	12			
1/2	12	12	5	5½	7½
5/8	15	12			
3/4	18	12			

(**15**) Side wall shingles shall be applied with a weather exposure of (*Specify exposure to the weather in inches from the following table.*)

Length of Shingles (in inches)	*Exposure of Shingles (in inches)*	
	Single Course	*Double Course**
16	6 to 7½	8 to 12
18	6 to 8½	9 to 14
24	8 to 11½	12 to 16

**Assuming exposed course is face or butt-nailed.*

(**16**) Shingles shall be doubled at all eaves (*Specify "tripled" where box cornices or narrow eaves occur.*)

(*Use 17 for side walls.*)

(**17**) and at foundation line.

(*To insure proper spill into gutters use 18.*)

(**18**) Butts of the shingles in the first course on roofs shall project 1½" from the first sheathing board.

(**19**) Roof shingles shall be spaced apart not less than ¼" nor more than ⅜".

(**20**) Side wall shingles shall be (*Specify spacing as in 21 or 22.*)

(**21**) laid with close jointed edges,

(**22**) spaced apart not less than ⅛″ nor more than ¼″,

(**23**) and the joints in the shingles in any one course shall be not less than 1½″ away from the joints in adjacent courses.

HIPS AND RIDGES

(*See pages 46 and 47 of this handbook.*)

(**24**) All hips and ridges shall be (*Specify type of which 25 is an example.*)

(**25**) the protected nailing type. Shingles shall be of approximately the same uniform width. The first shingle of the hip shall be sawed across the butt so that the end of the butt will be parallel with the butts of the shingles in the first course of shingles at the eave line. It shall then be nailed in place with the lower edge extending along a line previously marked off back from the center line of the hip on that side, the nails being placed so that they will be covered by the next hip shingle applied. The edge of this shingle projecting above the center line of the hip shall be cut back flush with the face of the opposite hip or ridge shingle. The next two shingles are now applied, but in reverse order, so that the final trimmed-off edge slants in a direction opposite to that of the first exposed edge.

VALLEYS

(*See pages 32 to 38 of this handbook. For clauses covering sheet metal flashings, etc., see 43 to 54.*)

(**26**) All valleys shall be (*Specify whether "open" or "closed" as in 27 and 28.*)

(**27**) open, with shingles lapping the valley flashing not less than 6″ on each side,

(**28**) closed, with flashings under each course to a width of 9″ on each side of the valley. (Closed valleys are not recommended.)

(**29**) Shingles extending into the valley shall be sawed to the proper miter.

(**30**) Breaking of joints in shingle courses into valley will not be permitted.

(**31**) Laying of shingles with grain parallel with the center line of the valleys, will not be permitted.

NAILS AND NAILING

(See pages 39 to 41 of this handbook.)

(Do not use bright, or blued, steel wire nails in applying CERTIGRADE *shingles.)*

(**32**) Each roof shingle shall be rigidly secured in place with not more than two full driven rust-resistant or zinc coated nails. (*Specify size.*)

(Use 33 with 37 for new roofs with 16" and 18" shingles and for new single-coursed side walls.)

(**33**) 3d shingle nails.

(Use 34 for new roofs with 24" shingles.)

(**34**) 4d shingle nails.

(Use 35 for new double-coursed side walls with all shingles, for over-roofing with 16" and 18" shingles, and for hips and ridges.)

(**35**) 5d "box" or special 14-gauge shingle nails.

(Use 36 for over-roofing with 24" shingles. For butt-nailing in double-coursing use small head 5d nails.)

(**36**) 6d "box" or special 14-gauge shingle nails.

(**37**) Use 5d nails for applying shingles to lath on gypsum or insulation board sheathing side walls.

(See pages 62 and 63 of this handbook.)

(**38**) Nails shall be driven flush but not so that the head crushes the wood and shall be placed not more than ¾" from the side edges of the shingles and from ¾" to 2" above the butt line of the shingles in the next course above.

(Use 39 where double-coursing occurs.)

(**39**) except that in butt-nailing in double-coursing, the nails shall be placed from 2" to 3" above the butt line.

FLASHINGS

(See pages 32 to 38 of this handbook.)

(**40**) All flashings and sheet metal throughout shall be (*Specify material, weights, etc.*)

(The proper choice of materials for valleys and flashings rests with the architect, and must, of course, be determined upon the basis of cost as well

as probable life. 16" Certigrade Red Cedar Shingles will give good service for 25 to 50 years or longer, depending upon grade, exposure, and pitch of roof; hence much consideration should be given to the proper choice of metal for flashings.)

LEAD: *Lead should be specified as "hard lead" weighing not less than 2½ lbs. per sq. ft. for step flashings and not less than 3 lbs. per sq. ft. elsewhere.*

TIN: *Tin or terne plates should be not less than IX (and if terne, coated with tin and lead, containing not less than 25% tin) and weighing not less than 300 lbs. per box of 112 sheets 20" x 28" in size.*

GALVANIZED IRON: *Galvanized Iron should be specified by gauge and coating using 24 or 26 gauge with a coating not less than 1½ ounces per square foot.*

ALUMINUM: *Aluminum should be specified as sheet aluminum not less than 0.024" in thickness.*

SOLDER: *Solder should be specified as half and half pig lead and block tin. Flux should be rosin for tin and acid for galvanized iron.*

(41) Proper allowance shall be made in all cases for expansion and contraction and all flat and lap seams shall be made in the direction of the flow of water.

(42) The Contractor shall provide flashings and counter-flashings wherever indicated on the drawings and as necessary to make a weather and water-tight job. Flashings shall be free from longitudinal joints.

VALLEY FLASHINGS

(*See pages 32 to 38 of this handbook.*)

(*Use 43 to 53 for Open Valleys and 54 for Closed Valleys.*)

(43) Longitudinal joints in valleys will not be permitted.

(44) Transverse joints shall be made shingle fashion and lap not less than

(*Use 45 for roofs of ½ pitch or steeper.*)

(45) 6 inches

(*Use 46 on roofs of ½ to ¼ pitch.*)

(46) 8 inches

(*Use 47 on roofs of less than ¼ pitch.*)

(47) 10 inches

(*Use 48 for tin.*)

(48) and shall be soldered.

(*Use 49 for lead.*)

(**49**) Valley sheets shall not be longer than 8 ft. Joints between lead sheets must be loose-locked, the joint being filled with an approved non-hardening compound. Lead valley sheets shall be secured with hard lead cleats folded into the loose-locked joints; the other end of the cleat being nailed free of the lead sheet.

(**50**) Valley sheets shall extend outward on each side from the center line of all valleys for a distance of at least (*Specify distance.*)

(Use 51 for ½ pitch and steeper and 52 for less than ½ pitch.)

(**51**) 7 inches.

(**52**) 10 inches.

(**53**) At the ridge line, the open portion of every valley shall be at least 2″ wide, increasing in width at the rate of at least ½″ per 8 ft. in length as it descends. Valleys uniform in width, and not less than 4″ wide shall be used where their length does not exceed 8 ft.

(**54**) Flashings for closed valleys shall be separate pieces so that there will be a flashing between each course of shingles. Each piece shall be set so as to lap at least 3″ and to be entirely concealed by the shingles; shall be fastened with nails at the top edge only; shall be sufficient length to extend 2″ above the top of each shingle and shall lap the flashing sheet below 3″.

MISCELLANEOUS FLASHINGS

(**55**) Hip and ridge flashings—if used—shall extend over the center line of the hip or ridge on each side for a distance of not less than 3″.

(**56**) Chimney flashings shall run up not less than 6″ under the shingles and if of galvanized iron shall be backed up with non-drying bituminous mastic where they come in contact with the brick. Counterflashings shall extend to within 1″ of the surface of the finished roof.

(**57**) Apron flashings shall extend to within 1″ of the surface of the finished roof.

(**58**) Where saddles or crickets are formed back of chimneys, curves or similar vertical surfaces, they shall be carried not less than 10″ under the shingles.

(**59**) Step flashings shall be used where vertical surfaces occur in connection with slopes. They shall be formed of separate pieces, shall turn up not less than 4″ at any point, shall be built into the masonry, shall lap generally 3″ but in no case less than 2″, shall not be soldered, shall follow the joints of masonry and shall be installed in reglets cut into these joints.

(**60**) Dormer flashings shall run up not less than 6″ under the shingles and at least 8″ up on the face and cheeks.

(**61**) Window caps and all other projections at points where rain water accumulates or piles up must be provided with flashings, such flashings to extend up under the shingles of the side walls or other outside finish for a distance of at least 6″.

(**62**) All pipes projecting through roofs shall be flashed and counterflashed. These flashings shall extend out on the roof, not less than 6″. They shall be of sufficient length to cover the shingle course next below the pipe and to extend up under the straight course above as far as possible without being punctured by nails.

(*Where plumbing vents are carried through roof surfaces, they are generally flashed by the plumber with lead—the lead being carried up on the outside of the pipe to the top, folded over the top of the pipe and the edge fastened against the inner face of the pipe. In case this is left for sheet metal worker to install it should be done in that manner and lead should always be used.*)

Covering Capacities of CERTIGRADE Shingles

Including the Number of Square Feet Covered by Four-Bundle Squares and Single Bundles for Exposures Given.

Exposure Inches	Sixteen-inch Shingles		Eighteen-inch Shingles		Twenty-four-inch Shingles	
	4-Bundle Square	One Bundle	4-Bundle Square	One Bundle	4-Bundle Square	One Bundle
3¾	75	18¾	....	....	....	....
4	80	20	72½	18	....	....
4½	90	22½	81½	20	....	....
5	**100***	**25**	90½	22½	....	....
5½	110	27½	**100***	**25**	....	....
6	120	30	109	27	80	20
6½	130	32½	118	29½	86½	21½
7	140	35	127	31½	93	23
7½	**†150**	**37½**	136	34	**100***	**25**
8	*160*	*40*	145½	36	106½	26½
8½	*170*	*42½*	**†154½**	**38½**	113	28
9	*180*	*45*	*163½*	*40½*	120	30
9½	*190*	*47½*	*172½*	*43*	126½	31½
10	*200*	*50*	*181½*	*45*	133	33
10½	*210*	*52½*	*191*	*47½*	140	35
11	*220*	*55*	*200*	*50*	146½	36½
11½	*230*	*57½*	*209*	*52*	**†153**	**38**
12	**‡240**	**60**	*218*	*54½*	*160*	*40*
12½	....	....	*227*	*56½*	*166½*	*41½*
13	....	....	*236*	*59*	*173*	*43*
13½	....	....	*245½*	*61*	*180*	*45*
14	....	....	**‡254½**	**63½**	*186½*	*46½*
14½	....	....	....	....	*193*	*48*
15	....	....	....	....	*200*	*50*
15½	....	....	....	....	*206½*	*51½*
16	....	....	....	....	**‡213**	**53**
16½	....	....	....	....	....	....
17	....	....	....	....	....	....
18	....	....	....	....	....	....

*Maximum exposure recommended for roofs.
†Maximum exposure recommended for single-coursing on side walls.
‡Maximum exposure recommended for double-coursing on side walls.

Figures in italics are inserted for convenience in estimating quantity of shingles needed for wide exposures in double-coursing, with butt-nailing. In double-coursing, with any exposure chosen, the figures indicate the amount of shingles for the outer courses.

Order an equivalent number of squares or bundles of lower grade shingles for the concealed courses.

● BEFORE AND AFTER — Cedar shingles and shakes are becoming increasingly popular for modernizing home exteriors. This older home was successfully transformed to a much more modern house—with but a minimum of structural change—simply by re-roofing with cedar shingles and applying double-coursed cedar shakes to the side walls.

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TRADE-MARKED
FOR YOUR PROTECTION!

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RED CEDAR SHINGLE BUREAU

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